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Forest Service

Tongass National Forest

R10-MB-485b

July 2004



# Gravina Island Timber Sale

## Final Environmental Impact Statement

### Volume I









United States  
Department of  
Agriculture

Forest  
Service

Alaska Region  
Tongass National  
Forest

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Date: July 23, 2004

Dear Reader:

Here is your copy of the Final Environmental Impact Statement (Final EIS) for the Gravina Island Timber Sale project area on the Ketchikan-Misty Fiords Ranger District, Tongass National Forest.

The Final EIS proposes five action alternatives for harvesting timber and one no-action alternative. The action alternatives would make available approximately 14 to 47 million board feet (MMBF) of timber available for harvest in the Gravina Island project area. Proposed harvest methods include even-aged, uneven-aged, and two-aged management.

The ROD will document my final decision on the Selected Alternative, and the facts considered in reaching the decision. The effective date of implementation for the decision and the Notice of Rights of Appeal are also specified in the ROD.

Copies of this Final EIS are available for review at Forest Service offices throughout the Tongass. For more information, contact the Ketchikan-Misty Fiords Ranger District at 907-225-2148.

I want to thank those of you who took the time to review and comment on the Draft Environmental Impact Statement. Your interest in the management of the Tongass National Forest is appreciated.

Sincerely,

FORREST COLE  
Forest Supervisor





# Gravina Island Timber Sale

## Final Environmental Impact Statement

**United States Department of Agriculture  
Forest Service Alaska Region**

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Tongass National Forest

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### Abstract

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The USDA Forest Service proposes to harvest up to approximately 111,813 CCF (47 million board feet (MMBF)) of timber in the Gravina Island project area, Ketchikan-Misty Fiords Ranger District, Tongass National Forest. Timber volume would be sold from this project in one or more sales. The actions analyzed in this EIS are designed to implement direction contained in the Tongass Land and Resource Management Plan (Forest Plan). The Final EIS describes six alternatives, which provide different combinations of resource outputs and spatial locations of roads and harvest units. The alternatives include: 1) No Action, proposing no harvest or road construction in the project area at this time; 2) provide the most economically efficient harvest of timber, harvesting 94.2 CCF (39.7 MMBF) of timber and building 20 miles of road; 3) emphasize subsistence values, as well as maintain scenery, wildlife, and watershed integrity, harvesting 92.2 CCF (38.7 MMBF) of timber and building 22.1 miles of road; 4) emphasize timber sale economics and roaded access, harvesting 111.8 CCF (47.2 MMBF) of timber and building 22.2 miles of road; 5) maintain the roadless character of the area by helicopter harvest only, harvesting 33.5 CCF (14.2 MMBF) of timber with no roadbuilding; 6) emphasize protection of subsistence values, in particular deer habitat, and the marine resources in Bostwick Inlet, harvesting 77.4 CCF (31.9 MMBF) of timber and building 17.4 miles of road.

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# Summary



## Summary

# Summary

## Introduction

In compliance with the National Environmental Policy Act (NEPA) and other relevant laws and regulations, the Forest Service has prepared this Final Environmental Impact Statement (EIS) on the effects of proposed timber harvest and related activities in on Gravina Island, Ketchikan-Misty Fiords Ranger District, Tongass National Forest (Figure S-1).

## Proposed Action

The Proposed Action would make available 111,813 CCF (approximately 47 MMBF) of timber, in multiple sales, to the Tongass timber sale program. The Gravina Island Timber Sale Final EIS discloses the direct, indirect, and cumulative environmental impacts and any irreversible or irretrievable commitment of resources that would result.

## Decision to be Made and Responsible Official

The Council on Environmental Quality (CEQ) regulations for implementing NEPA states that an EIS "...should present the environmental impacts of the proposal and the alternatives in comparative form, thus sharply defining the issues and providing a clear basis for choice among options by the decision-maker...." This EIS, in accordance with CEQ regulations, is not a decision document in itself, but is written to provide sufficient information for the decision-maker.

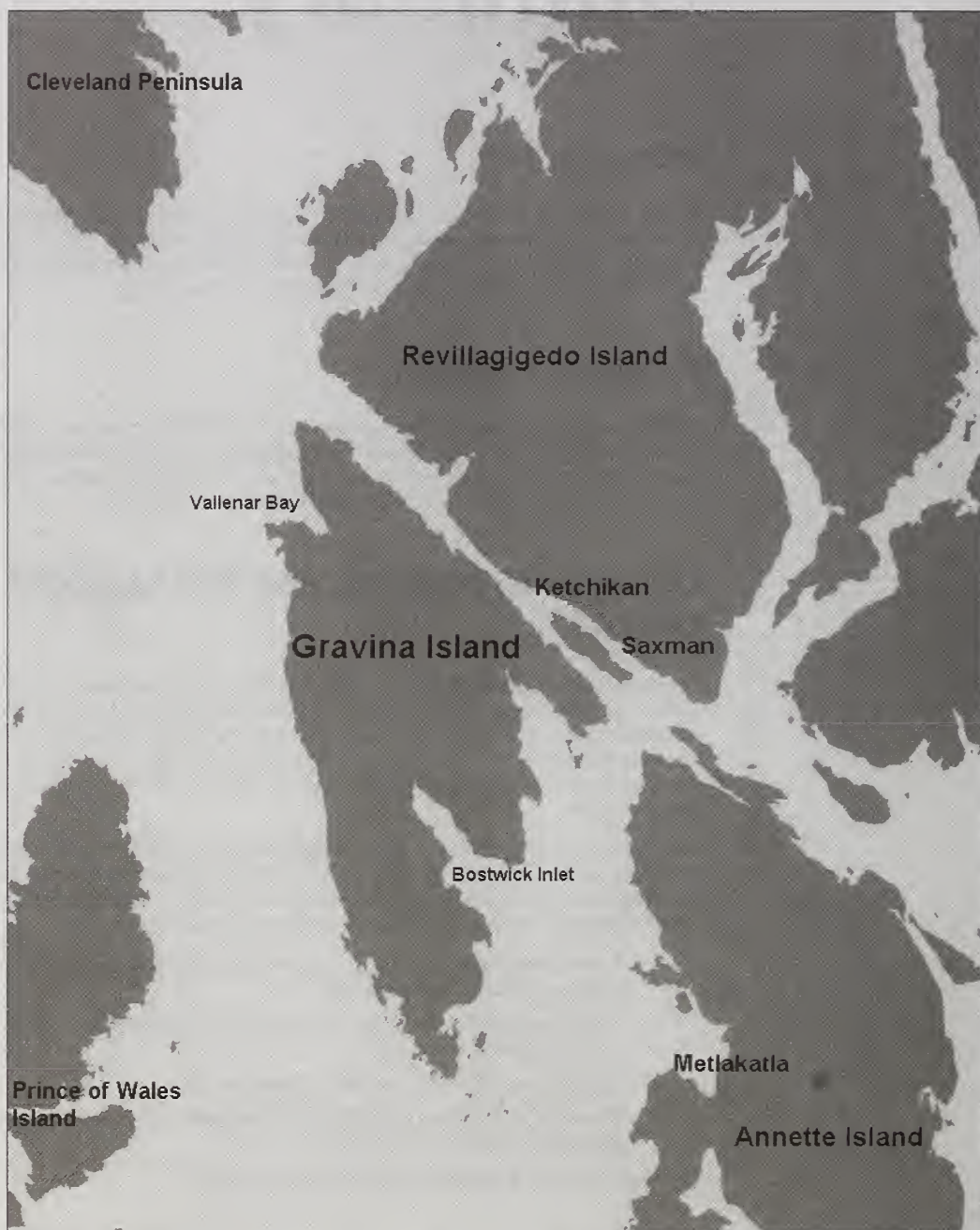
The Tongass Forest Supervisor is the responsible official for this project. He must decide whether or not, and if so how, to make timber available from Gravina Island in accordance with the implementation of the Tongass Land Management Plan (Forest Plan). Furthermore, if he selects an alternative which proposes timber harvest, he must decide:

- The location, design, and scheduling of timber harvest, road construction, log-transfer facilities, and silvicultural practices;
- Access management measures (road, trail, and area restrictions and closures associated with the timber sale project);
- Mitigation measures and monitoring requirements;
- Whether any changes in small Old-growth Reserves should be made and approved as an amendment to the Forest Plan.

The decision will be documented in the Record of Decision.

## Summary

Figure S-1  
Gravina Island Vicinity Map



Source: GIS, A. Grundy, 2000



## Project Area

Gravina Island lies to the west of Ketchikan on Revillagigedo Island and north of Metlakatla on Annette Island (see Figure S-1). At 61,404 acres, it is moderate in size compared to other islands in Southeast Alaska, yet to the people of Ketchikan, Metlakatla and Saxman it represents a diverse palette of cultural, economic and recreational opportunities. For some people it is a place for subsistence hunting, fishing and gathering of plants and marine life. To others it provides recreational opportunities in a pristine roadless area. To still others Gravina Island represents a chance for commercial and residential development in an area with a limited developable land base. National Forest System lands managed on Gravina Island encompass approximately 39,393 acres or 64 percent of the island.

## Purpose and Need for Action

The Gravina Island Timber Sale is proposed at this time to move the project area toward the desired condition identified in the Forest Plan. The Forest Plan identified Forest-wide multiple-use goals and objectives (Forest Plan, pages 2-2 to 2-5), which are achieved with the allocation of lands to land use designations (LUDs) and implementation of the management prescriptions and standards and guidelines specified for these LUDs. The Forest Plan assigned three land use designations to Gravina Island: Timber Production, Scenic Viewshed and Old-growth Habitat (Table S-1). These are shown in the Alternative 1 map at the end of Chapter 2. A fourth land use designation, Minerals, overlays portions of the Scenic Viewshed and Old-growth Habitat LUDs. Another land use designation, Semi-remote Recreation, is allocated to small islands adjacent to Gravina Island.

**Table S-1**  
Gravina Island Land Use Designations and non-National Forest System Acreages

Land Use Designation	Acres	Percent of Gravina Island (Percent of NFS lands is in parenthesis)
Timber Production	18,267	30% (46%)
Scenic Viewshed	8,077	13% (21%)
Minerals <sup>1</sup>	3,231	
Old-growth Habitat	13,049	21% (33%)
Minerals <sup>2</sup>	1,036	
Non-NFS Ownership	22,011	36% (N/A)
<b>Total Acres</b>	<b>61,404</b>	

<sup>1</sup> Minerals acreage is part of the Scenic Viewshed LUD.

<sup>2</sup> Minerals acreage is part of the Old-growth Habitat LUD.

Source: GIS, Al Grundy, 2000

The Gravina Island Timber Sale is designed to meet the Forest Plan goals and objectives. This project will move the area towards the desired condition by managing suitable timber lands for the production of saw timber and other wood products, and by creating a variety of successional stages to provide a range of wildlife habitat conditions. It emphasizes a natural-appearing landscape as viewed by users of visual priority travel routes and use areas in the Scenic Viewshed LUD; provides a diversity of old-growth habitat types, associated species, and ecological processes in Old-growth Habitat; and allows for mineral development.

# Issues and Concerns

Issues for the Gravina Island Timber Sale project were identified through public and internal scoping and further defined after analyzing comments on the Draft EIS and testimony from the subsistence hearings. Similar issues were combined into one issue statement where appropriate. The first three issues were identified early in the process. The fourth issue, that of preserving the roadless character of Gravina Island, resulted directly from analysis of comments on the Draft EIS. We developed alternatives to the Proposed Action to respond to these issues.

## Issues

### **Issue A: Timber Economics**

People are concerned about the economic viability of timber sales, and the impact of timber harvest on the economy in the Ketchikan area and throughout Southeast Alaska. Alternative 2 addresses this issue.

### **Issue B: Subsistence**

There is concern that subsistence resources and traditional uses can be impacted by an open road system on the island and that any activity in Bostwick Inlet will affect the marine subsistence resources. Alternatives 1, 3, 5 and 6 address this issue.

### **Issue C: Access Management**

Road and trail access on Gravina Island can provide additional recreation opportunities for Ketchikan. Alternatives 3, 4 and 6 address this issue.

### **Issue D: Roadless Character and Wilderness Eligibility**

Harvesting trees and building and maintaining a road system for recreational use will change the roadless character of the island. Alternatives 1 and 5 address this issue.

## Other Concerns

The following concerns were considered but determined not to be alternative-driving issues. Some are already addressed through other processes or in the Forest Plan (see "Items Common to All Alternatives" in Chapter 2), or their resolution is beyond the scope of this project. As needed, resource effects related to these concerns are discussed in Chapter 3.

### **Concern: Fish Habitat and Water Quality**

Fish Habitat and Water Quality can be affected by harvesting and road building. This concern is addressed through a description of impacts and mitigation for each alternative.

### **Concern: Small Old-growth Reserves**

The existing location and size of the three small Old-growth Habitat Reserves. This concern is addressed with Forest Plan Standards and Guidelines and by adopting interagency biologists recommendations for changing the reserves.

### **Concern: Scenic Integrity**

Impacts to the Scenic Integrity of several viewsheds could result from harvesting. This concern is addressed through mitigation common to all alternatives.

## Alternatives Considered for Detailed Study

Six alternatives are considered in detail. Alternative 1 is the No-action Alternative, under which the project area would have no timber harvest or road construction at this time, and would remain subject to natural or ongoing changes only. The action alternatives represent different means of satisfying the Purpose and Need, by responding with different emphases to the significant issues discussed in Chapter 1. Maps of all alternatives considered in detail are provided at the end of Chapter 2. The map for Alternative 1, the No-action Alternative, represents the current condition of the project area. Larger-scale maps of the alternatives are contained in the project planning record. All action alternatives would implement the modification of the three small Old-growth Reserves as recommended in the interagency report. See Chapter 2 for a more detailed discussion and comparison of the alternatives considered.

**Alternative 1 (No Action)** proposes no new timber harvest or road construction at this time, and represents the baseline against which the other alternatives are compared.

**Alternative 2** is designed to address the issue of timber supply and economics (Issue A). It emphasizes positive economics by maximizing the number of units harvested by conventional cable systems and limiting the number of helicopter units to those with short flight distances. This alternative minimizes road building and constructs one log transfer facility (LTF) at Bostwick Inlet.

**Alternative 3** is designed to minimize potential effects to areas of popular subsistence use on Gravina Island and to reduce impacts to fish and wildlife habitat. This alternative would also reduce potential impacts on scenery by not harvesting units that are highly visible from Ketchikan and other critical viewsheds near Gravina Island.

**Alternative 4 (the Proposed Action)** responds to the issue of timber for the local economy (Issue A) and access for recreational use (Issue C). After the logging, the main portion of new road (approximately 15.6 miles) would remain open for recreational purposes.

**Alternative 5** emphasizes the retention of the roadless character of the island by not building roads (Issue D), and utilizes only helicopter yarding.

**Alternative 6** emphasizes water quality and protection of important fish and wildlife subsistence values (Issue B).

## Effects of the Alternatives

The effects of the alternatives on the resource issues and concerns are summarized in the table below. For a more complete discussion of the environmental effects, see Chapter 3 of this Final EIS.

Table S-2  
Comparison of Alternatives by Issue

	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
<b>Proposed Actions</b>						
Total volume harvested CCF (MBF) (excluding right-of-way) <sup>1</sup>	0	94,183 (39,740)	92,220 (38,748)	111,813 (47,178)	33,507 (14,198)	77,420 (31,860)
Acres harvested (excl. right-of-way)	0	1,801	1,818	2,218	803	1,562
Percent of suitable acres harvested	0	26%	27%	33%	12%	23%
<b>Issue A: Timber Economics</b>						
Total logging cost (\$/CCF) <sup>2</sup>	0	169.49	182.73	178.21	200.51	178.77
Net stumpage, current market (\$/CCF) <sup>3</sup>	0	20.16	5.62	12.57	(5.39)	2.33
Direct employment (jobs/year) <sup>3</sup>	0	249	243	295	88	204
<b>Issue B: Subsistence</b>						
Potential activity in Bostwick Inlet	None	LTF & Barge	Barge	Barge	Barge	Barge
Reduction in existing deer habitat capability	0	9%	8%	11%	5%	5%
Possibility of significant restriction	No	Yes	Yes	Yes	No	Yes
<b>Issue C: Access Management</b>						
System road construction (total miles) <sup>4</sup>	0	20.04	22.08	22.24	0	17.41
Road miles open to motorized vehicles in the project area (NFS land portion only)	0	0	0	15.6	0	0
One-time cost to close road	\$0	\$315,400	\$343,800	\$99,000	\$0	\$273,300
Annual cost to maintain roads	\$0	\$6,220	\$6,873	\$19,993	\$0	\$5,411
<b>Issue D: Roadless Characteristics</b>						
Reduction in roadless area from harvest and roads (percent)	0	25	20	24	0	19
<b>Concern: Fish Habitat and Water Quality</b>						
Class I and II stream crossings	0	16	14	15	0	12
Class III stream crossings <sup>5</sup>	0	12	9	12	0	9
<b>Concern: Small Old-growth Reserves</b>						
Modification implemented	0	Yes	Yes	Yes	Yes	Yes
<b>Concern: Scenic Integrity</b>						
Viewsheds meeting higher VQO than Forest Plan S&G, post timber harvest <sup>6</sup>	12	6	5	5	6	5

<sup>1</sup> Includes sawlog and utility.

<sup>2</sup> With optional removal of utility logs.

<sup>3</sup> Expected value at current market conditions, NEAT, Second Quarter 2003.

<sup>4</sup> Road mileage includes all temporary and classified roads.

<sup>5</sup> In the Draft EIS, Class IV stream crossings were included with Class III. They are omitted in the Final EIS.

<sup>6</sup> Viewsheds will meet a standard higher than required in the Forest Plan, post timber harvest.

Source: 2003, 2004



# **Chapter 1**

## **Purpose and Need**



# Chapter 1

## Purpose and Need

### Introduction

The Forest Service has prepared this Environmental Impact Statement (EIS) on the potential effects of timber harvest and associated activities, including road construction on National Forest System lands on Gravina Island (see Figure 1-1) in compliance with the National Environmental Policy Act (NEPA) and other relevant Federal and State laws and regulations. This Final EIS states the Purpose and Need for the proposed Gravina Island Timber Sale and discloses the direct, indirect, and cumulative environmental impacts and any irreversible or irretrievable commitment of resources that would result from the Proposed Action and alternatives. The project is within the Ketchikan-Misty Fiords Ranger District, Tongass National Forest, Alaska.

This EIS is prepared according to the format established by Council on Environmental Quality (CEQ) regulations implementing NEPA (40 CFR 1500-1508). The Interdisciplinary Team (IDT) used a systematic approach for analyzing the proposed project and alternatives, estimating the environmental effects, and preparing this EIS. The planning process complies with NEPA and the CEQ regulations. Planning was coordinated with the appropriate Federal, State, and local agencies, and local federally recognized tribes. The public, agencies and tribes were involved in development of the issues and alternatives through public meetings, interdisciplinary team meetings, letters and personal conversations.

**Chapter 1**, in addition to explaining the Purpose and Need for the Proposed Action, discusses how the Gravina Island Timber Sale project relates to the Tongass Land and Resource Management Plan (Forest Plan), and identifies the significant issues driving the environmental analysis.

**Chapter 2** describes the Proposed Action, compares alternatives to the Proposed Action and a No-action Alternative, and summarizes the significant environmental consequences by issue.

**Chapter 3** describes the natural and human environments potentially affected by the Proposed Action and alternatives, and discloses what potential effects are anticipated.

**Chapter 4** contains the list of preparers, the EIS distribution list, literature cited, a glossary, and an index.

**Appendices** provide additional information on specific aspects of the proposed project.

Appendix A of this document describes how this project relates to the overall timber program for the Tongass National Forest. This EIS summarizes and incorporates additional analyses by reference where appropriate.

Additional documentation, including more detailed analyses of Gravina Island resources, may be found in the project planning record located at the Ketchikan-Misty Fiords Ranger District Office in Ketchikan, Alaska.

### Document Organization

## Purpose and Need

### Forest Plan Goals and Objectives

The Forest Plan includes Forest-wide goals and objectives, and area-specific land use designation (LUD) goals, objectives, and desired future conditions. The Purpose and Need includes implementing Forest Plan direction for the Timber Production and Scenic Viewshed land use designations. Applicable Forest-wide goals and objectives include:

- Manage the timber resource for production of saw timber and other wood products from suitable timber lands made available for timber harvest, on an even-flow, long-term sustained yield basis and in an economically efficient manner (Forest Plan, page 2-4).
- Seek to provide a timber supply sufficient to meet the annual market demand for Tongass National Forest timber, and the market demand for the planning cycle (Forest Plan, page 2-4).
- Provide a diversity of opportunities for resource uses that contribute to the local and regional economies of Southeast Alaska (Forest Plan, page 2-3).
- Support a wide range of natural-resource employment opportunities within Southeast Alaska's communities (Forest Plan, page 2-3).
- Approval of a non-significant amendment to the Forest Plan adopting changes in small Old-growth Habitat Reserves recommended by the interagency biologists.

The Gravina Island Timber Sale project responds to goals and objectives of the Forest Plan, and helps move the project area towards desired future conditions described in that plan.

## Proposed Action

A "Proposed Action" was defined early in the project-level planning process. This served as a starting point for the interdisciplinary team, and gave the public and other agencies specific information on which to focus comments. Using these comments, and information from resource analysis, the interdisciplinary team developed alternatives to the Proposed Action.

Alternative 4 represents the Proposed Action. When the Draft EIS was published, the initial Proposed Action was to harvest approximately 90,051 CCF (37 MMBF) from 2,218 acres, with approximately 22.6 miles of new road. Five alternatives were considered in detail, and Alternatives 3 and 4 were identified as the Preferred Alternatives. An additional alternative, Alternative 6, was added in the Final EIS in response to comments received.

## Decisions to Be Made

Based on the environmental analysis in this EIS, the Tongass Forest Supervisor will decide in the Record of Decision if, where, and how to make timber available from the Gravina Island Timber Sale project in accordance with Forest Plan goals, objectives, and desired future conditions. This decision will include:

- the location, design, and scheduling of timber harvest, road construction, log-transfer facilities, and silvicultural practices,
- approval of a non-significant amendment to the Forest Plan adopting changes in small Old-growth Habitat Reserves recommended by the interagency biologists,



- access management measures (road, trail, and area restrictions and closures associated with the timber sale project), and
- mitigation measures and monitoring requirements.

## Project Area

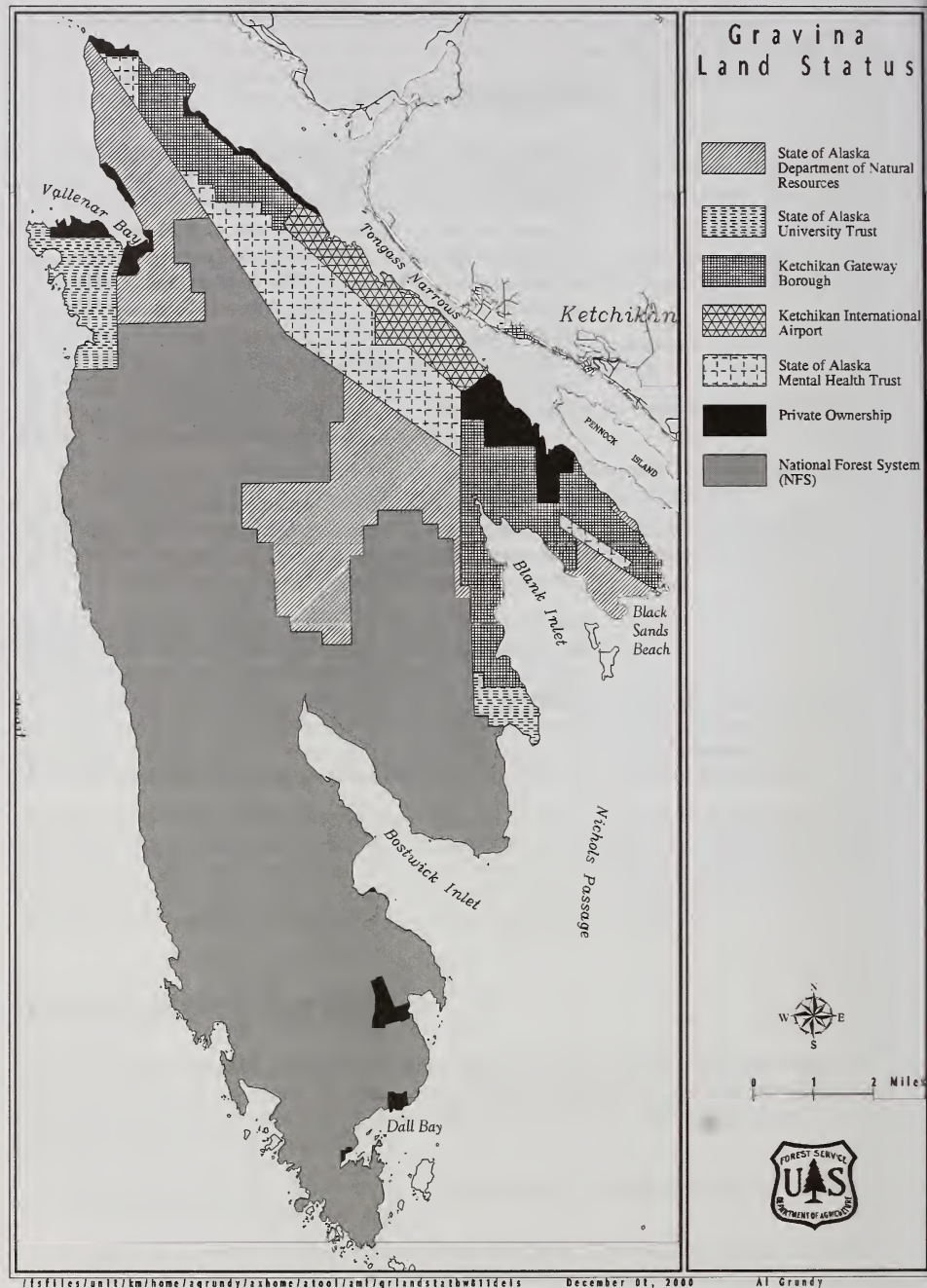
Gravina Island is west of the communities of Ketchikan and Saxman and north of Metlakatla in the southeast corner of Alaska. (See the vicinity map, Figure S-1, in the Summary chapter). Currently, Gravina Island is accessible only by water or air. The Ketchikan International Airport is located on Gravina Island and is accessible from Ketchikan by airport ferry or commercial floatplane. National Forest System lands encompass approximately 39,393 acres on Gravina Island (Figure 1-1). The northern and eastern portions of Gravina Island include ownerships by Ketchikan Gateway Borough, various State agencies and private landowners. Alaska Department of Natural Resources administers lands in the central and eastern part of the island as well as the Vallenar Bay area in the northwest. The Alaska State Parks Department manages a park at Black Sands Beach on the eastern side of the island, near the mouth of Blank Inlet, and a new State marine park is proposed in Dall Bay at the southern end. Bostwick Inlet, an area that is actively used for subsistence resources, is located along the southeastern side of the island.

The project area includes Value Comparison Units (VCUs) 7610, 7620, 7630, 7640, and 7650. VCUs are similar in size to large watersheds in Southeast Alaska (5,000 to 10,000 acres), and follow generally recognizable watershed divides. VCUs are delineated on the Existing Conditions Map (Alternative 1) at the end of Chapter 2.

Gravina Island consists entirely of Wildlife Analysis Area (WAA) 101. WAAs are Forest Service land divisions that correspond to “Minor Harvest Areas” used by Alaska Department of Fish and Game. This geographic area is used for the wildlife and subsistence analyses in Chapter 3.

# 1 Purpose and Need

Figure 1-1  
Gravina Island Land Ownership



Source: A. Grundy, GIS, 2000

## Relationship to the Forest Plan

Planning takes place at national, regional, forest, and project levels. The Forest Plan is a forest-level analysis. It embodies the provisions of the National Forest Management Act, its implementing regulations, and other guiding documents, and sets forth in detail the direction for managing the land and resources of the Tongass National Forest. The Forest Plan is the result of extensive analysis, which is described in the Forest Plan Final EIS and the 1997 Record of Decision.

The Gravina Island Timber Sale EIS is a project-level analysis; its scope is confined to addressing the significant issues and possible environmental consequences of the project. It does not attempt to address decisions made at higher levels. It does, however Gravina Island Timber Sale Final EIS tiers to the Forest Plan EIS, as encouraged by 40 CFR 1502.20.

### Forest Plan 1997 Record of Decision

In *AFA v. USDA* (J99-0013 CV(JKS)), the U.S. District Court, District of Alaska vacated the 1999 Record of Decision for the Tongass Forest Plan and upheld the 1997 Record of Decision. This project is consistent with the 1997 Record of Decision for the Revised Tongass Land Management Plan.

### Forest Plan Supplemental EIS

In *Sierra Club v. Lyons* (J00-0009 CV (JKS)), the U.S. District Court, District of Alaska directed the Forest Service to prepare a Supplemental Environmental Impact Statement (SEIS) that evaluates and considers roadless areas within the Tongass for recommendation as potential wilderness areas. The Notice of Availability for the Final SEIS and Record of Decision appeared in the *Federal Register* on March 7, 2003. In the SEIS Record of Decision, the No Action Alternative was selected, in which no additional wildernesses were recommended and the existing Land Use Designations were maintained. The roadless inventory and roadless area descriptions were updated to support the Supplemental EIS, and were incorporated into the Gravina Island Final EIS analysis.

The Forest Plan uses land use designations (LUDs) to guide management of the National Forest System lands within the Tongass. Each LUD provides for a unique combination of activities, practices and uses. The Gravina Island Timber Sale project area includes three LUDs: Timber Production, Scenic Viewshed, and Old-growth Habitat (Table 1-1). A fourth land use designation, Minerals, overlays portions of the Scenic Viewshed and Old-growth Habitat LUDs. Another land use designation, Semi-remote Recreation, is allocated to small islands adjacent to Gravina Island. Goals, objectives, and desired future conditions of each LUD are summarized below, and the LUD locations are shown in Alternative 1 (Existing Conditions) map at the end of Chapter 2. Chapter 3 of the Forest Plan contains a detailed description of each land use designation.

### Timber Production

Approximately 30 percent of the lands on Gravina Island (46 percent of the National Forest System land) have a land use designation (LUD) of Timber Production. Most of the proposed harvest units and road construction are within this LUD. The goals of this designation are to:

- maintain and promote industrial wood production from suitable timber lands, providing a continuous supply of wood to meet society's needs,
- manage these lands for sustained long-term timber yields, and
- seek to provide a supply of timber from the Tongass National Forest which meets the annual and planning-cycle market demand, consistent with the standards and guidelines of this land use designation.

For Timber Production, the desired future condition includes a sustained yield of timber, healthy tree stands in a balanced mix of age classes from young stands to trees of harvestable

## Forest Plan Land Use Designations and Desired Future Conditions



# 1 Purpose and Need

age, and a road system providing access for timber management as well as recreation, hunting and fishing, and other public uses. Recreation opportunities associated with roaded settings are available. Future desired condition is that some suitable and available timber stands will be in the early and middle successional stages.

## Scenic Viewshed

About 13 percent of Gravina Island (21 percent of the National Forest System land) is designated as Scenic Viewshed. The goals of this designation are to:

- provide a sustained yield of timber and a mix of resource activities while minimizing the visibility of developments as seen from visual priority travel routes and use areas,
- recognize the scenic values of suitable timber lands viewed from selected popular roads, trails, marine travel routes, recreation sites, bays, and anchorages, and modify timber harvest practices accordingly.

Timber management objectives of the Scenic Viewshed land use designation are the same as those for Timber Production. The scenery objective is to apply the retention visual quality objective in the foreground zone, and partial retention in the remaining zones, as seen from visual priority travel routes and use areas.

For Scenic Viewshed, the desired future condition emphasizes a natural-appearing landscape as viewed by users of visual priority travel routes and use areas. Recreation and tourism opportunities in a range of settings are available. A variety of successional stages providing wildlife habitat occur, although late successional stages predominate.

## Old-growth Habitat

Approximately 21 percent of Gravina Island (33 percent of the National Forest System land) is designated as Old-growth Habitat. No road construction is proposed under any alternative within the Old-growth Habitat LUD.

The goals of this designation are:

- maintain areas of old-growth forests and their associated natural ecological processes to provide habitat for old-growth associated resources,
- manage early seral conifer stands to achieve old-growth forest characteristic structure and composition based upon site capability.

For Old-growth Habitat, the desired future condition is that all forested areas attain old-growth forest characteristics and provide a diversity of old-growth habitat types, associated species, and ecological processes.

## Minerals

There are 4,267 acres of National Forest System lands on Gravina Island in a Minerals land use designation, located at the southern end of the island. The Minerals LUD "overlays" designations of Scenic Viewshed and Old-growth Habitat in this area. The goals of this designation are to:

- encourage the prospecting, exploration, development, mining, and processing of locatable minerals in areas with the highest potential for minerals development,
- insure that minerals are developed in an environmentally sensitive manner, and that other high-valued resources are considered when minerals developments occur.

The desired future condition for Minerals is that after completion of any mining operations, affected areas are rehabilitated, and in most cases, the area once again provides the settings and opportunities of the original land use designation.

**Table 1-1**  
Gravina Island Land Use Designations and non-National Forest System Acreages

Land Use Designation	Acres	Percent of Gravina Island (Percent of NFS lands is in parenthesis)
Timber Production	18,267	30% (46%)
Scenic Viewshed	8,077	13% (21%)
Minerals <sup>1</sup>	3,231	
Old-growth Habitat	13,049	21% (33%)
Minerals <sup>2</sup>	1,036	
Non-NFS Ownership	22,011	36% (N/A)
<b>Total Acres</b>	<b>61,404</b>	

<sup>1</sup> Minerals acreage is part of the Scenic Viewshed LUD.

<sup>2</sup> Minerals acreage is part of the Old-growth Habitat LUD.

Source: GIS, A. Grundy, 2000

## Forest Plan Standards and Guidelines

The following standards and guidelines delineate areas that are not available for programmed timber harvest; each applies to a specific habitat or ecological component. These areas are included within the Scenic Viewshed and Timber Production designations described above. Other Forest Plan Standards and Guidelines apply, and are summarized in Chapter 2. Detailed information about these and other standards and guidelines is included in the Forest Plan, Chapter 4.

### Beach and Estuary Fringe

The beach and estuary fringe is an area of approximately 1,000 feet inland from mean high tide around all marine coastlines. Programmed timber harvest is not allowed and roads are located outside the fringe when possible.

### Karst and Caves

Potential karst areas have been identified within the project area, and are categorized as low, medium, or high vulnerability. Refer to Figure 3-14 in the Geology, Minerals, and Karst section in Chapter 3. High-vulnerability areas are not suitable for programmed timber harvest. No karst-developed caves were found adjacent to or within the proposed harvest units.

### Riparian Management Areas

Riparian Management Areas (RMAs) are areas of special concern to fish, other aquatic resources, and wildlife. These areas are delineated according to the process group direction in the Forest Plan Riparian Standards and Guidelines. Timber harvest is not scheduled in Riparian Management Areas. RMAs are shown in the unit cards in Appendix B of the Draft EIS.

### Slopes Steeper than 72 Percent

Slopes steeper than 72 percent have been identified in the project area. Highly unstable areas are not suitable for programmed timber harvest. No harvest is planned on slopes greater than 72 percent unless a site-specific visit and recommendation from a qualified soils scientist has been made. Areas of steep slopes and management recommendations are displayed on the unit card and road cards in Appendix B of the Draft EIS.

## Public Involvement

### Scoping

The Council on Environmental Quality (CEQ) defines scoping as "...an early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to a Proposed Action" (40 CFR 1501.7). Among other things, the scoping process is used to invite public participation, to help identify public issues, and to obtain public comment at various stages of the EIS process. Although scoping begins early, it is really a process that continues until a decision is made. In addition to the following specific activities, the Gravina Island Timber Sale project has been listed on the Tongass National Forest Schedule of Proposed Actions and included in the Tongass National Forest 10-Year Timber Sale Action Plan.

#### Notice of Intent (NOI)

A Notice of Intent was published in the *Federal Register* on November 1, 1999, when it was decided that an EIS was to be undertaken for the project.

#### Public Mailings

On December 14, 1999, a scoping letter providing information and seeking public comment was mailed to 368 individuals and groups that had previously shown interest in Forest Service projects in Southeast Alaska. This included Federal and State agencies, Alaska Native groups, municipal offices, businesses, interest groups, and individuals. A total of 25 responses to this initial mailing were received. On April 1, 2000, a letter displaying the significant issues and preliminary alternatives was mailed to 378 individuals and groups. Sixteen responses to this mailing were received.

#### Public Meetings

Public meetings were held in Ketchikan on November 23, 1999, January 20, 2000 and January 26, 2000 to provide project information, present the Proposed Action, and discuss local concerns and interests that should be addressed in the Gravina Island Timber Sale project analysis. In addition, the Gravina interdisciplinary team participated in the Ketchikan Planning Fair on October 6, 1999. Discussions during these meetings identified issues and concerns that are reflected in the issue statements. Twelve written responses were received following these meetings. After the Draft EIS was published, public information meetings were held in Ketchikan on March 1, 2001, and in Metlakatla on May 15, 2001. In addition, in January 2002, the Forest Service began inviting public participation in monthly Big NEPA meetings, in which IDT members discuss the current status of all planning projects, including Gravina Island.

#### Local News Media

A legal ad for the Notice of Availability of the Draft EIS was published in the Jan. 24, 2001 edition of the *Ketchikan Daily News*. Display ads for public meetings in Ketchikan and Metlakatla were published in the *Ketchikan Daily News* on Feb. 9, 2001 and May 12, 2001. A news release was published in the *Ketchikan Daily News* on March 6, 2001 regarding the extension of the Draft EIS public comment period from March 19 to June 26, 2001. Display ads for subsistence meetings to be held in Metlakatla, Saxman, and Ketchikan were published in the *Ketchikan Daily News* on Feb. 9, 2001 and April 14, 18, 21, and 23, 2001.

#### Consultation with Tribal Governments

Government-to-government consultation with federally recognized tribal governments and meetings with traditional tribal governments have taken place as follows:

- Ketchikan Indian Corporation (KIC) - November 10, 1998
- Metlakatla Indian Community (MIC) - October 14, 1999 and December 6, 1999
- Saxman Tribal Council - September 22, 1999
- KIC Subsistence Committee - September 30, 1999



- Tongass Tribe/KIC representatives - November 23, 1999

Tribal government representatives from the Tongass Tribe and KIC participated with the interdisciplinary team in developing alternatives on March 14, 2000. Additionally, consultations were held with tribes after the issues and alternatives were identified:

- KIC - March 23, 2000
- MIC - April 27, 2000
- Tribal Council meeting (MIC) - Jan. 16, 2001
- Joe Williams (Saxman) - March 12, 2001

Additional meetings were held with all three tribal leaders:

- MIC, KIC, Saxman - February 13, 2002
- Joe Williams (Saxman) - May 7, 2002
- MIC, KIC, Saxman - March 22, 2004

During 2002-2003, the Ketchikan-Misty Fiords Ranger District Heritage Program participated in additional consultations with the Native Site Guardianship Council and with tribal governments and traditional clans in Ketchikan, as part of our response to concerns expressed during public comment and tribal government consultations regarding the Gravina Draft EIS. Recognizing that prehistoric and historic archaeological resources are irreplaceable Heritage resources, we are working to establish a program that would provide increased opportunities for concerned and responsible individuals selected by the tribal governments and traditional clans to be an important and integral part of managing heritage resources.

### **Meetings with Agencies, Communities and Other Groups**

An interagency group of biologists met on October 22, 1998 to review the location and use of the small Old-growth Reserves on Gravina Island.

The following meetings were also held to identify issues and alternatives:

- Ketchikan Gateway Borough Planning Department – August 8, 1998
- Ketchikan Gateway Borough Planning Department – May 18, 1999
- Ketchikan Working Group – August 10, 1999
- Ketchikan Gateway Borough Planning Department and HDR, Inc. (Borough consultant) – August 11, 1999
- Ketchikan Gateway Borough Planning Department – August 18, 1999
- U.S. Army Corps of Engineers – September 16, 1999
- Ketchikan Gateway Borough Planning Dept. and Ketchikan Working Group – October 4, 1999
- Alaska Mental Health Trust Lands and Borough Planning Dept. – May 21, 1998 and October 6, 1999
- Ketchikan Chamber of Commerce – January 12, 2000
- Tongass Conservation Society subsistence discussion meeting and video at Ted Ferry Center – December 1, 2001
- Alaska Dept. of Natural Resources and Ketchikan Gateway Borough Planning Dept. – February 5, 2004.

Meetings were held with other local, State and Federal agencies in conjunction with the Gravina Access Project: September 27, 1999, October 7, 1999, November 15, 1999, December 14, 1999, January 26 and 27, 2000, February 16, 2000, and March 15, 2000.

# 1 Purpose and Need

An independently facilitated session was held on May 12, 2000 to discuss coordination of plans with other land management agencies. Participants included: Ketchikan Gateway Borough, Alaska Department of Natural Resources, U.S. Army Corps of Engineers, Alaska Mental Health Trust Lands, Metlakatla Indian Community, Ketchikan Indian Corporation, Organized Village of Saxman, National Marine Fisheries Service, U.S. Fish and Wildlife Service, and Alaska Department of Fish and Game.

In addition, Ketchikan Gateway Borough Planning Dept., Alaska Department of Fish and Game, U.S. Fish and Wildlife Service and U.S. Army Corps of Engineers participated throughout the process with the interdisciplinary team in identifying issues and developing alternatives.

## Draft EIS

### Availability of Draft EIS for Public Comment

Availability of the Draft EIS was announced on January 19, 2001, both in the *Federal Register* and through legal notice published January 24, 2001 in the *Ketchikan Daily News*. These notices started a public comment period, which began January 24, 2001. The comment period was extended beyond the required 45 days, to June 26, 2001, to provide the public more opportunity to review and comment on this sale while questions about the National Roadless Conservation Rule were being resolved. The Draft EIS document was also mailed to Federal and State agencies, Native and municipal offices, and others who requested it.

### Subsistence Hearings

Following publication of the Draft EIS, subsistence hearings were held in Metlakatla on February 13, 2001, in Saxman on February 26, 2001, and in Ketchikan on April 23, 2001. Testimony from these hearings is included as Appendix C of this Final EIS.

## Final EIS

### Publication of the Final Environmental Impact Statement

The Notice of Availability of this Final EIS has been published in the *Federal Register* and through legal notices in the *Juneau Empire*, the newspaper of record and in the *Ketchikan Daily News*. These notices initiate a 45-day appeal period, during which the project cannot yet be implemented. Copies of the Final EIS have been mailed to Federal and State agencies, federally recognized tribal governments, municipal offices, and to those who requested them or responded to the Draft EIS. The Final EIS is also available at the Ketchikan-Misty Fjords Ranger District Office.

## Public Input

### Analysis and Incorporation of Public Comments on the Draft EIS

Approximately 121 agencies, organizations, and individuals submitted written comments on the Gravina Island Draft EIS. In addition, approximately 4,350 e-mail form letter comments were received opposing the project, primarily from the Alaska Rainforest Campaign, the Sierra Club and the Defenders of Wildlife websites. These comments helped to further define the issues associated with timber harvest and road building on Gravina Island, and recommended additional mitigation measures and alternatives to be considered. In analyzing these comments, the IDT carried forward the three significant issues from the Draft EIS (Timber Economics, Subsistence, and Access Management) and identified Roadless Character and Wilderness Eligibility as a fourth issue to be tracked throughout this Final EIS. These issues and other concerns are discussed in the section titled "Issues" below.

The following paragraphs summarize information and comments we received on the Draft EIS and from the subsistence hearing testimonies. For a topical summary of the public comments, and the Forest Service responses, see Appendix B of this Final EIS. The subsistence hearing testimony is included in Appendix C of this Final EIS.



## Alaska Natives

Four local tribal groups were represented throughout this process: Metlakatla Indian Community (MIC), Ketchikan Indian Corporation (KIC), Saxman IRA, and the Tongass Tribe. Tribal governments are generally most concerned about the subsistence resources on the island. Tribal groups have used marine life and deer as subsistence for many years and are concerned that these resources be available for future generations. Of primary concern is the ability to pass the tribal culture of subsistence harvesting on to the next generation. ANSCA (Alaska Native Claims Settlement Act) corporations express concern that timber commodities be available for small operators. In early 2002, all three federally recognized tribes prepared resolutions opposing timber harvest on Gravina Island.

### Metlakatla Indian Community (MIC)

MIC is a federally recognized tribe. Metlakatla needs the jobs that harvest on Gravina could provide but is very concerned about resource damage and the effect on marine life, especially in Bostwick Inlet. The people of Metlakatla also expressed concern about the visual integrity of southern Gravina because this is visible from Metlakatla. Metlakatlans are very concerned that harvest and road building on Gravina Island could result in resource damage and pose restrictions on their subsistence lifestyle. Metlakatla has been involved in this planning process from the beginning; originally opinions varied between no harvest at all on Gravina Island to having a need for small business set-aside type harvest opportunities. With the closure of Metlakatla's sawmill in 1999, opportunities for direct job-related benefits from a timber sale on Gravina Island were reduced. Community sentiment now strongly supports protection of the subsistence lifestyle, particularly in Bostwick Inlet. The tribal government opposes any timber harvest or road construction on Gravina Island.

### Organized Village of Saxman

Saxman is a federally recognized tribe, immediately adjacent to Ketchikan, and its economy is linked to the larger community. Saxman depends heavily on the tourist industry generated in Ketchikan. The tribal government is very concerned with maintaining traditional subsistence uses on Gravina Island and retaining its natural character, and opposes any timber harvest or road construction on Gravina Island.

### Ketchikan Indian Community (KIC)

Representatives from KIC have also been involved in development of this project. KIC is a federally recognized tribe, representing many Native people who live in and around the Ketchikan area. Alaska Native people have used the natural resources of Gravina Island for many years to sustain themselves physically and spiritually. There are many place names on and near the island that indicate a long and intimate relationship to the island. KIC members are most concerned about protecting the marine habitat in Bostwick Inlet and firmly believe that any activities such as barge drops, a log transfer facility or a logging road could do irreparable harm to the area, impacting subsistence resources. They are also concerned that open roads or loop roads will change the deer hunting opportunities on the island. There is also a concern for the protection of salmon streams, especially Bostwick Creek. KIC opposes timber harvest or road construction on Gravina Island. If a road were built on Gravina, KIC would like its location to be reviewed with the KIC Tribal Council to ensure cultural sites are not impacted and would like to see the road removed after logging to protect the roadless qualities of the island.

### Tongass Tribe

The Tongass Tribe is a traditional Tlingit tribe. Representatives of Tongass Tribe were involved in the development of the project alternatives. They share many of the concerns expressed by KIC (most are KIC members), and explained that many areas of Gravina Island have a long history of use and cultural importance to particular families and clans. These "family areas" are passed down to family members even today.

### ANSCA Corporations

Klukwan, Inc. is a for-profit company associated with the community of Klukwan, and holding lands on Long Island and Dall Island off the southwest end Prince of Wales Island. Klukwan's

# 1 Purpose and Need

## Community Organization Participation

interests in the Ketchikan area are related to ownership of local construction firms. Klukwan is responsible to its shareholders to provide economic stability and opportunity. The comments from this group focused on providing timber from Gravina Island and providing access to the island for Ketchikan residents. The corporation supports clearcutting, roadbuilding, cable/shovel logging and an LTF at Bostwick Inlet for its economic feasibility.

Local organizations that participated in the planning process represent the wide range of values in the community. These include the Ketchikan Chamber of Commerce (Chamber), Tongass Conservation Society, Alaska Forest Association (AFA), and Glacier Grotto.

### Chamber of Commerce

The Chamber of Commerce represents approximately 400 businesses and individuals in the Ketchikan area. They assert that the timber from Gravina is important to the economy of the community and also that Gravina could provide access to additional recreational opportunities. The Chamber states that an LTF in Tongass Narrows would be the most economical and would aid with a roaded connection to the Tongass Narrows side of the island. The Chamber urges the Forest Service to seek appropriated funds for recreational development on Gravina. The Chamber maintains that a lack of coordination now with other agencies and landowners will lead to problems and additional expense later to coordinate roads. The Chamber sees an opportunity to interpret forest management activities on Gravina. The Chamber asks that an economic analysis be completed to assure that alternatives are economically viable. The Chamber members also ask that adjustments to small Old-growth Reserves not exceed the minimum requirements of the Forest Plan.

### Alaska Forest Association (AFA)

AFA states that wood harvested from Gravina can help support the local economy, and transportation, camping, deer hunting, and other recreation activities are compatible with timber harvest. While AFA believes that locating an LTF in Bostwick is the most economical alternative, they also think the Forest Service should pursue appropriated funds for a recreational link to Tongass Narrows. AFA urges the Forest Service to analyze barge log transfer facilities as opposed to log transfer facilities that allow for rafting. AFA also asks the Forest Service to implement Forest Plan Standards and Guidelines for visuals. The Forest Service should look at unit design and natural contours when designing units while making them the most economical, and the agency should provide economically feasible alternatives by maximizing timber volume per mile of road, maximizing use of temporary roads, limiting the use of expensive logging systems, and minimizing constraints on LTFs. AFA suggests minimizing turn distance from helicopter units and utilizing clearcut prescriptions to the maximum extent possible to improve economics. They also ask that small Old-growth Reserves not exceed minimum requirements of Forest Plan.

### Tongass Conservation Society

The Tongass Conservation Society, a local environmental group, is primarily concerned with roading an Inventoried Roadless Area prior to a final decision on the Roadless Area Conservation Rule. They are also concerned with effects of this project on traditional and cultural uses occurring on the island. They do not support any timber harvest or road building on Gravina Island.

### Glacier Grotto

The Glacier Grotto is a local club made up of individuals interested in spelunking and other aspects of caving. They have been instrumental in helping us locate potential karst resources and have contributed to the verification of the electronic karst vulnerability mapping done for Gravina Island. They are not opposed to timber harvest as long as karst standards and guidelines are applied.

## Local Governments

Local governments also helped to shape the design of the project by participating with the IDT, adding comments to the proposals or offering new ideas. The Ketchikan Gateway Borough

Planning Department, Ketchikan Gateway Borough Assembly, the City of Ketchikan mayor and Ketchikan Gateway Borough mayor contributed to the planning process.

## **Ketchikan Gateway Borough (Borough)**

The Borough supports the proposal to harvest timber on Gravina Island so that manufacturing facilities in Southeast Alaska have sufficient timber to meet their needs; they urge the Forest Service to make sure sales are economically feasible. The Borough urges the Forest Service to continue to coordinate plans with Gravina Access Project, Ketchikan 2020, Wetlands Inventory, the Airport Expansion Master Plan, Alaska Mental Health Trust Lands, Ketchikan Coastal Zone Management Plan, Ketchikan Comprehensive Plan and the State Central/Southern Southeast Area Plan. The Borough sees this project as an avenue to offer increased recreational opportunities to Ketchikan. The Borough supports an LTF on the Tongass Narrows, and a loop road through State land. The Borough opposes an LTF in Bostwick because of the conflict with other uses of the area. The Borough urges the Forest Service to seek recreational funds for portions of the road that directly benefit recreation, so that timber sales can be economical, and to look at harvest prescriptions that best meet the intent of Forest Plan land use designations and that are economically feasible.

Federal and State agencies, either as adjacent landowners or as regulatory agencies, were integral to the process by offering project designs or mitigations and coordination for adjacent activities. These include the Alaska Department of Fish and Game (ADFG), Alaska Department of Natural Resources (DNR), Alaska Mental Health Trust Lands (AMHT), Alaska Division of Governmental Coordination (currently DNR, Office of Project Management and Permitting), U.S. Fish and Wildlife Service (USFWS), U.S. Army Corps of Engineers, and National Marine Fisheries Service.

## **Alaska Department of Natural Resources (DNR)**

DNR is supportive of activities that link State lands to a road system so that timber harvest on their lands can be achieved economically. DNR has coordinated the preparation of their 5-year timber sale plan with the Gravina Island project. They have indicated that they are willing to work with us and other landowners in applying similar management objectives.

## **Alaska Division of Governmental Coordination (DGC) (currently DNR, Office of Project Management and Permitting)**

DGC is concerned about the availability and accessibility of subsistence resources for the local communities of Ketchikan, Saxman and Metlakatla. They are concerned with the project's relationship to the Roadless Rule, and also requested more information regarding coarse-canopy studies. In addition, they have expressed concern as to the effects of an open road system on fish and wildlife resources.

## **Alaska Mental Health Trust (AMHT)**

AMHT is also supportive of activities that link Trust lands to a road system so that timber harvest on their lands can be achieved economically. AMHT could grant easements to the Forest Service across their lands, and although they would prefer to see roads remain open, they are willing to work with other landowners in applying similar management objectives.

## **Alaska Department of Fish and Game (ADFG)**

ADFG is concerned about the availability and accessibility of subsistence resources for the local communities of Ketchikan, Saxman and Metlakatla. They believe the island provides important deer, marine invertebrate and seaweed harvest for local residents. Bostwick Inlet and Vallenar Bay support important sport fisheries as well as having important estuaries, wetland, and tideflats. ADFG also expresses concern for protection of habitats for goshawks, marten, black bear, wolves, and deer, and recommends implementation of the small Old-growth Reserve modifications, as recommended by the interagency committee, as well as connectivity corridors between major drainages. ADFG is concerned about cumulative impacts on deer and wolf populations if the road system remains open for recreation purposes and for other

## **State and Federal Agencies**



# 1 Purpose and Need

landowners to harvest timber. ADFG comments that use of the existing barge bulkhead at Tongass Narrows would have less impact than an LTF at Bostwick Inlet or Vallenar Bay.

## **U.S. Fish and Wildlife Service (USFWS)**

USFWS is most concerned about effects on fish and wildlife habitats and populations. They also support maintaining opportunities for fish and wildlife-oriented recreation. Of particular concerns are old-growth habitats and cumulative impacts, second-growth management, road management, LTFs, subsistence, wolves, goshawks, marten, bald eagles, wetlands, beach and riparian buffers, fisheries and inventories.

## **Other Public Comments**

Many individuals also contributed their personal time to this project. These citizens demonstrated their interest in management of the Tongass National Forest by participating at public meetings, writing letters or making phone calls. Concerns range from consideration of the human element in land planning, including people's needs for developable land, the need for community economic development opportunities, commodities to generate income, and recreational and wilderness experiences, to resource issues such as karst, wildlife, soils, water, visuals and fisheries. Some people are concerned that much of the Tongass has already been harvested and that undisturbed areas on Gravina in particular should remain in an undisturbed state. Many people expressed concern that the Forest Service planning should be coordinated with other landowners on Gravina and that cumulative impacts of other ownerships be acknowledged and analyzed. While some people feel strongly that there should be no roads on Gravina and the island retain its relatively pristine condition, others are adamant that Ketchikan needs additional roads on Gravina for recreational access and residential and industrial development.

Non-local organizations, such as the Forest Conservation Council and Cascadia Wildlands, also offered comments and suggestions that reflect national values for National Forest System lands. Cascadia suggests that the Forest Service stop industrial logging, preserve the roadless character of Gravina, protect karst, marine life, threatened and endangered species, management indicator species, examine impacts of helicopter logging on wildlife, tourists and residual trees and address the issue of small operators. They asked that decisions on where to locate Old-growth Reserves not be based on logging needs. They requested a map showing other land ownerships on the island, discussion of the cumulative impacts of other projects, and a serious discussion of the No-action Alternative. The Forest Conservation Council echoes the same concerns while maintaining that non-timber uses and values are far more important to local communities and regional economies than income generated from timber sales. See Appendix B for public comments by these and other organizations.

## Issues

### Issues

Issues for the Gravina Island Timber Sale project were identified through public and internal scoping and further defined after analyzing comments on the Draft EIS and testimony from the subsistence hearings. Similar issues were combined into one issue statement where appropriate. The first three issues were identified early in the process. The fourth issue, preserving the roadless character of Gravina Island, resulted directly from analysis of comments on the Draft EIS. We developed alternatives to the Proposed Action to respond to these issues; Chapter 2 of this Final EIS discusses and compares the alternatives.

- **Issue A: Timber Economics** - People are concerned about the economic viability of timber sales, and the impact of timber harvest on the economy in the Ketchikan area and throughout Southeast Alaska.
- **Issue B: Subsistence** - There is concern that subsistence resources and traditional uses can be impacted by an open road system on the island, which may increase hunting by non-rural residents on Gravina Island. There is also concern that any activity in Bostwick Inlet may affect the marine subsistence resources.
- **Issue C: Access Management** - Road and trail access on Gravina Island can provide additional recreation opportunities for Ketchikan.
- **Issue D: Roadless Character and Wilderness Eligibility** - Harvesting trees and building and maintaining a road system for recreational use will change the roadless character of the island. Additionally, opposition was expressed against any timber harvest in inventoried roadless areas.

### Other Concerns

The following concerns were considered but determined not to be alternative-driving issues. Some are already addressed through other processes or in the Forest Plan (see "Items Common to All Alternatives" in Chapter 2), or their resolution is beyond the scope of this project. As needed, resource effects related to these concerns are discussed in Chapter 3.

- **Fish Habitat and Water Quality** can be affected by harvesting and road building. This concern is addressed through a description of impacts and mitigation for each alternative.
- The existing location and size of the three small **Old-growth Habitat Reserves**. This concern is addressed with Forest Plan Standards and Guidelines and by adopting interagency biologists recommendations for changing the reserves.
- Impacts to the **Scenic Integrity** of several viewsheds could result from harvesting. This concern is addressed through mitigation common to all alternatives.
- Opposition to any logging in old-growth forests.
- Opposition to clearcutting.

## Federal and State Permits, Licenses, and Certifications

Prior to implementation of the proposed timber sale, various permits would need to be obtained from other Federal and State agencies. Administrative action on these permits would be initiated after the EIS is filed with the Environmental Protection Agency (EPA). The agencies and their responsibilities are listed below.

### **U.S. Army Corps of Engineers**

Section 404 of the Clean Water Act (1977, as amended) requires a permit from the Corps of Engineers before filling or dredging in wetlands and tidelands. A permit would be needed for the new log transfer facility in Bostwick Inlet (Alternative 2), and for maintaining project roads as open for public recreational use (Alternative 4). Under an exemption, no 404 permits would be needed for road construction that is conducted for silvicultural purposes (Alternatives 2, 3, and 6), or for timber harvest (all action alternatives).

### **U.S. Coast Guard**

A Coast Guard Bridge Permit (in accordance with the General Bridge Act of 1946) is required for all structures constructed across navigable waters of the U.S. This would be needed to construct the Bostwick Inlet log transfer facility (Alternative 2).

### **U.S. Environmental Protection Agency**

A Storm Water Discharge Permit and a National Pollutant Discharge Elimination System review (Section 402 of the Clean Water Act) would be needed for the Bostwick Inlet log transfer facility (Alternative 2) and the Pacific Log & Lumber Company barge bulkhead facility (Alternatives 3, 4, and 6).

### **Alaska Department of Environmental Conservation**

DEC participates in cooperative water quality management through Section 319 of the Clean Water Act and a memorandum of Agreement with the Forest Service. They also issue a certification of compliance with Alaska Water Quality Standards under Section 401 of the Clean Water Act. These would be needed for the Bostwick Inlet log transfer facility (Alternative 2) and the Pacific Log and Lumber Company barge bulkhead facility (Alternatives 3, 4, and 6).

### **Alaska Department of Natural Resources**

A right-of-way agreement for access and maintenance would be needed for new road construction on DNR lands (Alternatives 2, 3, 4, and 6).

### **Alaska Mental Health Trust**

A right-of-way agreement for access and maintenance would be needed for new road construction on AMHT lands (Alternatives 3, 4, and 6).

### **Ketchikan Gateway Borough**

A right-of-way agreement for access and maintenance would be needed for new road construction on Borough lands (Alternatives 3, 4, and 6).

## Applicable Laws and Executive Orders

Shown below is a partial list of Federal laws and Executive Orders pertaining to project-specific planning and environmental analysis on Federal lands. While most pertain to all Federal lands, some of the laws are specific to Alaska. Disclosures and findings required by these laws and orders are contained in Chapter 2 of the Draft EIS.

- Alaska Native Claims Settlement Act (ANCSA) of 1971
- Alaska National Interest Lands Conservation Act (ANILCA) of 1980
- American Indian Religious Freedom Act of 1978
- Archeological Resource Protection Act of 1980
- Cave Resource Protection Act of 1988
- Clean Air Act of 1970 (as amended)
- Clean Water Act of 1977 (as amended)
- Coastal Zone Management Act (CZMA) of 1972 (as amended)
- Coastal Zone Management Act MOU of 1999
- Endangered Species Act (ESA) of 1973 (as amended)
- Executive Order 11593 (cultural resources)
- Executive Order 11988 (floodplains)
- Executive Order 11990 (wetlands)
- Executive Order 12898 (environmental justice)
- Executive Order 12962 (aquatic systems and recreational fisheries)
- Executive Order 13007 (Indian sacred sites)
- Executive Order 13175 (government-to-government consultation)
- Forest and Rangeland Renewable Resources Planning Act (RPA) of 1974 (as amended)
- Magnuson-Stevens Fishery Conservation and Management Act of 1996
- Marine Mammal Protection Act of 1972
- Migratory Bird Treaty Act of 1918 (amended 1936 and 1972)
- Multiple-Use Sustained-Yield Act of 1960
- Native American Graves Protection and Repatriation Act (NAGPRA) of 1990
- National Environmental Policy Act (NEPA) of 1969 (as amended)
- National Forest Management Act (NFMA) of 1976 (as amended)
- National Historic Preservation Act of 1966 (as amended)
- National Transportation Policy (2001)
- Organic Act of 1897
- Rivers and Harbors Act of 1899
- Tongass Timber Reform Act (TTRA) of 1990
- Wild and Scenic Rivers Act of 1968, amended 1986



# 1 Purpose and Need

## State of Alaska

Under the Coastal Zone Management Act (CZMA) of 1972, as amended, Forest Service activities and development projects that affect the coastal zone must be consistent to the maximum extent practicable with the enforceable policies of the Alaska Coastal Management Program (ACMP). Such “consistency determinations” are made by the Forest Service, and are reviewed by the State of Alaska as required by the CZMA.

Under the Alaska Forest Resources and Practices Act (AFRPA) of 1979 (as amended), Forest Service timber harvest projects satisfy the CZMA consistency requirement if the Forest Plan and all related standards and guidelines applicable to the project provide no less resource protection than the AFRPA requires for timber harvest projects on State land, except that the AFRPA specifies a different minimum riparian standard for Federal projects than for State projects. The Forest Plan Standards and Guidelines and mitigation measures described in Chapters 2 and 3 of this document meet or exceed the State standards.

## Availability of the Planning Record

An important consideration in preparation of this EIS has been reduction of paperwork as specified in 40 CFR 1500.4. In general, the objective is to furnish enough site-specific information to demonstrate a reasoned consideration of the environmental impacts of the alternatives and how these impacts can be mitigated. The planning record contains material that documents the NEPA process and analysis from the beginning of the project to the publication of the Final EIS.

The planning record is located at the Ketchikan–Misty Fiords Ranger District office in Ketchikan, Alaska. Reference documents, such as the Tongass National Forest Land and Resource Management Plan (Forest Plan) and the Tongass Timber Reform Act, are available for review at Forest Service offices throughout Southeast Alaska, including the Forest Supervisor's office in Ketchikan. The Forest Plan is also available on the Internet (<http://www.fs.fed.us/r10/tongass/>) and on CD-ROM.

# **Chapter 2**

## **Alternatives**

# Chapter 2

## Algebra

Section 2.1: The Real Number System

Section 2.2: Properties of Real Numbers

Section 2.3: Operations with Real Numbers

Section 2.4: Solving Linear Equations

Section 2.5: Solving Systems of Linear Equations

Section 2.6: Solving Quadratic Equations

Section 2.7: Solving Systems of Quadratic Equations

Section 2.8: Solving Systems of Linear and Quadratic Equations

Section 2.9: Solving Systems of Three Linear Equations

# Chapter 2

## Alternatives

### Introduction

This chapter describes and compares the alternatives for the Gravina Island Timber Sale project. It includes a discussion of how alternatives were developed, an overview of mitigation measures, monitoring and other features common to all alternatives, a description and map of each alternative considered in detail, and a comparison of these alternatives focusing on the significant issues. Chapter 2 is intended to present the alternatives in comparative form, sharply defining the issues and providing a clear basis for choice among options by the decision maker and the public (40 CFR 1502.14).

Some of the information used to compare alternatives at the end of Chapter 2 is summarized from Chapter 3, "Affected Environment and Environmental Consequences." Chapter 3 contains the detailed scientific basis for establishing baselines and measuring the potential environmental consequences of each of the alternatives.

### Changes Between Draft and Final

Since publication of the Gravina Island Timber Sale Draft EIS in January 2001, several changes have occurred: a new alternative was added, a new method for analyzing timber market economics was developed, additional field work was done, and changes in Forest Service policy occurred. These changes are described below.

#### **Additional Printing of Draft EIS**

In July 2004, a printing of 100 additional copies of the Draft EIS was run, to respond to recent requests for the Gravina Island Draft EIS document. One change from the original Draft EIS was made. The original Draft EIS was printed in January 2001 but the spine erroneously read "2000". The reprint of the Draft EIS corrects the year on the document spine to read "2001". This change is noted on the inside front cover of the reprinted version of the Draft EIS.

#### **Preferred Alternatives**

In the Draft EIS, Alternative 4 was identified as the Preferred Alternative. In a letter sent shortly after publication of the Draft EIS, the Forest Service identified both Alternatives 3 and 4 as Preferred Alternatives. Alternative 3 proposes harvesting 92,220 CCF (38.7 MMBF) of timber from 1,818 acres of National Forest System land, and building 20.1 miles of new road. Alternative 4 proposes harvesting 111,813 CCF (47.2 million board feet) of timber from 2,218 acres of National Forest System land, and building 22.2 miles of new road. Both alternatives would utilize an existing log transfer facility on the Tongass Narrows. One notable difference between these two alternatives is that Alternative 3 would close all National Forest System roads following completion of the timber sale, while Alternative 4 would leave the mainline roads open for recreational use.

## 2 Alternatives

### Development of Additional Alternative

Several respondents to the Draft EIS requested the Forest Service to create an additional alternative in the Final EIS that would offer a volume intermediate between Alternatives 3 and 5. These respondents thought the range of volumes in the Draft EIS was inadequate. Other respondents were concerned that the alternative designed to be most favorable to fish and wildlife (Alternative 3) did not adequately protect subsistence uses related to fisheries, marine resources, and deer populations and habitat. Based upon these comments, a new alternative (Alternative 6) is considered in this Final EIS. Alternative 6 combines elements of the previously analyzed alternatives and offers a volume intermediate between Alternatives 3 and 5.

### Changes in Timber Economics

The Forest Service Timber Sale Preparation Handbook requires a financial efficiency analysis to compare benefits and costs of a project. The Draft EIS used high and low market values to compare the economic efficiency of the alternatives at that time. Due to new direction, the economic efficiency analysis used in this Final EIS compares expected gross revenues to estimated costs using the Forest Service NEPA economic analysis tool (NEAT; Second Quarter 2003 market data), in order to estimate the expected bid values and direct employment outputs for each alternative. Due to changes in market conditions, the expected bid values are lower than those reported in the Draft EIS. These estimates are useful for comparing the alternatives, but would likely differ from a final appraisal due to more accurate cruise information. The final appraisals for any sales that would result from implementation of this project would include current quarter Transaction Evidence Appraisal data and current cost information to determine the advertised rate.

### Changes in Timber Volume per Acre

The Draft EIS identified a range of harvest volumes between 29,453 CCF (approximately 12.5 MMBF) in Alternative 5 to 90,051 CCF (approximately 37.8 MMBF) in Alternative 4. This volume was based on a combination of cruise and stand exam sample plots taken prior to publication of the Draft EIS.

Between Draft and Final, additional field inventory occurred. By collecting data from 200 additional stand exam plots between the Draft and Final EIS, we were able to strengthen the volume and log quality estimates. This more-accurate information was used to develop a stand table for the project. The NEPA Economic Analysis Tool (NEAT) uses the stand table to calculate the volume by species per alternative based on stand characteristics. NEAT is a Transaction Evidence Appraisal method and considers high, medium and low volume strata to compute volume-per-acre, species composition and species quality.

These updated volumes are displayed by alternative in Table 2-1. The unit acres and locations remained the same.

### Changes in Unit Silvicultural Prescriptions

When the Draft EIS was published, silvicultural prescriptions were applied to units to address potential resource concerns. Additional field inventory resulted in more accurate data, and changes in prescriptions were recommended for the Final EIS. Portions or all of seven units (48, 78, 86, 93, 94, 96, and 103) were changed to uneven-aged management to address soils and scenery concerns. Portions or all of four units (23, 28, 77, and 89) were determined not to have significant scenery or other resource concerns, so the prescriptions were changed from uneven-aged to even-aged to improve the economics. In nine units (20, 21, 30, 34, 35, 40, 47, 53, and 79), the prescriptions were changed from even-aged clearcut with reserves to clearcut for similar reasons. (A small percentage of Units 34, 40, and 53 would be placed in reserve for high value marten habitat.) Additionally, typographical corrections were made in the prescription information displayed in the cards for four units (5, 45, 92, and 104). All of these units are displayed in Appendix F, Unit and Road Card Changes, of this Final EIS.



## Changes to Road Segments

Adjustments were made to three road segments between the Draft and Final EIS. Road 8100320 was shortened to avoid crossing a V-notch stream crossing. Road 8105100 was dropped from this Final EIS, and road 8105200 was re-numbered as 8105100 to follow transportation system conventions. Similarly, roads 8100200 and 8100220 were re-numbered to better match transportation system conventions; the design and total length of the segments remained the same. These segments are shown in Appendix F, Unit and Road Card Changes, of this Final EIS.

## Policy Changes

### Forest Plan 1997 vs 1999 Record of Decision

In *AFA v. USDA* (J99-0013 CV(JKS)), the U.S. District Court, District of Alaska vacated the 1999 Record of Decision for the Tongass Forest Plan and upheld the 1997 Record of Decision. This project is consistent with the 1997 Record of Decision for the Revised Tongass Land Management Plan.

### Forest Plan Supplemental EIS

In *Sierra Club v. Lyons* (J00-0009 CV (JKS)), the U.S. District Court, District of Alaska directed the Forest Service to prepare a Supplemental Environmental Impact Statement (SEIS) that evaluates and considers roadless areas within the Tongass for recommendation as potential wilderness areas. The Notice of Availability for the Final SEIS and Record of Decision appeared in the *Federal Register* on March 7, 2003. In the SEIS Record of Decision, the No-action Alternative was selected, in which no additional wildernesses were recommended and the existing Land Use Designations were maintained. The roadless inventory and roadless area descriptions were updated to support the SEIS, and were incorporated into the Gravina Island Final EIS analysis.

### Roadless Area Conservation Rule

The Roadless Area Conservation Rule (January 12, 2001) generally prohibited timber harvest and road construction in inventoried roadless areas. On December 30, 2003 after analysis of current conditions in SE Alaska and public comment on the proposal, the Department amended the roadless rule so that actions on the Tongass National Forest are not subject to the prohibitions ( against commercial harvest and roadbuilding ) in the roadless rule.

## Development of Alternatives

During the early stages of planning, a logging system and transportation analysis was completed for the project area. Based on this analysis, the suitable timber in the project area was divided into potential harvest areas, or units. This group of units is called the unit pool and is described in the Silviculture and Timber Resources section in Chapter 3. These units and the proposed road system were surveyed in 1998 and 1999, and further field-reviewed in 2000.

Approximately 6,802 acres of suitable forest that met Forest Plan Standards and Guidelines could have been included in the potential unit pool. Approximately 4,584 acres were not included in any of the alternatives because the risk to resources was too high, or the units were too small or too far from other areas to harvest economically.

Based on short- and long-term landscape or resource objectives (see Chapter 1), the Interdisciplinary Team (IDT) identified preliminary timber harvest prescriptions for potential harvest areas. These potential harvest areas and the roads necessary to access them were then evaluated in the field. From this pool of harvest areas, the responsible official identified a Proposed Action, which served as the basis for scoping.

Potential harvest areas were validated, modified, dropped and/or deferred based on findings of field investigations. Modifications were made as needed to meet Forest Plan Standards and Guidelines. For instance, if a previously unknown stream was discovered, the Riparian Standards and Guidelines were applied. Some units were adjusted to have more logical

## 2 Alternatives

boundaries or to facilitate logging systems. This effort led to the current unit pool from which the action alternatives were developed.

The IDT used information from public scoping, including the significant issues identified for the project (see Chapter 1), in conjunction with the field-verified unit pool and related resource information, to formulate alternatives to the Proposed Action. The Proposed Action and each action alternative were presented in the Draft EIS to provide a different response to the significant issues. Each action alternative is also designed to meet the stated Purpose and Need for the Gravina Island Timber Sale project and the project-specific desired future conditions.

As the planning process continued, additional field information combined with analysis of public comments on the Draft EIS and subsistence testimony was used to further refine the action alternatives. These comments led to the development of Alternative 6 as described above.

Each action alternative represents a site-specific proposal developed through intensive interdisciplinary evaluation and field verification. Within the range of options they provide, the decision maker can consider various combinations of the alternatives in determining the Selected Alternative.

### Items Common to All Alternatives

All alternatives are consistent with the Forest Plan. All applicable Forest-wide and Land Use Designation Standards and Guidelines have been incorporated. The Forest Service uses many mitigation and preventive measures in the planning and implementation of land management activities. The application of these measures begins during the planning and design phases of a project. Additional direction comes from applicable Forest Service manuals and handbooks.

The following items are listed to highlight some of the key direction from the Forest Plan (primarily from Chapter 4, "Forest-wide Standards and Guidelines"). See also the next section, Project-specific Mitigation, and the unit cards and road cards in the Draft EIS and in Appendix F of this Final EIS.

#### Standards and Guidelines

##### Biodiversity and Old Growth

Each alternative complies with the Forest Plan conservation biology strategy designed to ensure well-distributed viable populations of wildlife.

The small Old-growth Habitat Reserves (Old-growth Habitat land use designation) mapped in the Forest Plan Final EIS have been evaluated through an interagency process for size, spacing, and habitat composition. The recommendations of the interagency review included expanding the boundaries of two of the three small Old-growth Habitat Reserves, which, as mapped in the Forest Plan, do not meet minimum requirements for total acres and/or acres of productive old-growth forest (timber volume of at least 8,000 board feet per acre). The review also recommended relocating the third small reserve to protect higher-value deer winter habitat. These proposed changes would be incorporated under all action alternatives through a non-significant amendment to the Forest Plan. As proposed, the small reserves would exceed Forest Plan minimum requirements for size and acres of productive old growth (POG). Under the No-action Alternative, no changes to small Old-growth Habitat Reserves would be made at this time. The Interagency Review Report is located in the Gravina Island project planning record.

##### Fish and Marine Habitats

Forest Plan Standards and Guidelines for riparian areas are applied to all fish streams within the project area, and to non-fish-bearing Class III streams.

Watershed assessment for the project has included landscape, watershed, and site-level considerations. No opportunities were identified for adjusting Riparian Management Area boundaries. Unit cards and road cards (Appendix B of the Draft EIS and Appendix F of this Final EIS) show which streams are likely to need special attention during implementation, such as applying timing restrictions for in-stream activities, or using larger-than-normal culverts or bridges.

## **Karst Resources**

All activities have been designed to avoid high-vulnerability karst, and to meet Forest Plan Standards and Guidelines for low- and moderate-vulnerability areas.

## **Heritage Resources**

Areas considered as having a high probability of containing heritage resources (cultural sites) have been intensively surveyed by heritage resource specialists. All identified cultural sites would be avoided. We have completed consultations with the Alaska State Historic Preservation Officer and other interested parties, per the Section 106 process. Measures to be taken in the event that a cultural site is discovered during project implementation are described in Chapter 3.

## **Recreation**

Recreation resources provide opportunities on National Forest System lands in concert with, and supplemental to, those opportunities which are located on other land ownerships and jurisdictions. The following Forest Plan guidance is applicable to recreation areas, sites, and facilities in the Gravina Island project area:

- complement commercial public services (i.e. resorts, marinas, stores, service stations) within communities or on private or other public land,
- support a system of anchorages suitable for recreation boats along small boat waterways, which connect communities or provide access to popular recreation attractions, and
- provide other appropriate facilities to meet specific identified recreation needs on a case-by-case basis.

## **Scenery**

Areas within the viewshed of a priority travel route or use area as identified in the Forest Plan, if retained in the timber-suitable land base, have been allocated to Scenic Viewshed land use designations. Proposed timber harvest units have been designed to meet or exceed the visual quality objectives of the applicable land use designations.

## **Soils, Water Quality and Wetlands**

Potential harvest units with slopes greater than 72 percent have received an on-site analysis of slope, and an assessment of potential downstream effects. Only areas with relatively low levels of risk are included in the unit pool.

Road locations avoid slopes greater than 67 percent, unstable areas, and slide-prone areas where it is feasible to do so. All roads have been located and would be designed to avoid or minimize effects on wetlands.

## **Subsistence**

All alternatives have been evaluated in compliance with ANILCA, Title VIII, Section 810. All action alternatives may result in a significant restriction on subsistence uses and resources in the project area. Subsistence hearings have been held as required.

## **Threatened, Endangered and Sensitive Species**

The National Marine Fisheries Service has concurred that the actions described within the proposed project are not likely to adversely affect threatened and endangered species. A



complete biological assessment is included in the planning record for this project. Consultation was done with the U.S. Fish and Wildlife Service; no terrestrial threatened or endangered species are known to occur in the Gravina Island Timber Sale project area.

Biological evaluations for all sensitive species potentially inhabiting the project area have been completed. The Forest Plan contains standards and guidelines for each designated sensitive species, and these are incorporated into the project as applicable.

### **Wildlife Habitat**

The Forest Plan conservation biology strategy, including all species-specific standards and guidelines, is considered sufficient to maintain habitat for viable populations for all species potentially within the project area, including small endemic terrestrial mammals.

Gravina Island is part of the Revillagigedo Island/Cleveland Peninsula biogeographic province, which is considered a high-risk province for American marten habitat. In such areas, timber harvest units that contain high-value marten habitat must meet specific Forest Plan Standards and Guidelines. Because less than 33 percent of the original productive old-growth (POG) forest has been harvested in each of the five VCUs in the project area, standards and guidelines include retaining: 1) 10-20 percent of the original stand structure, 2) an average of at least four large trees (20-30 inch DBH or greater) per acre for future snag recruitment, 3) an average of at least three large decadent trees per acre, and 4) an average of at least three pieces per acre of down material (logs 20-30 inches or greater in diameter and 10 feet long), generally distributed throughout the harvest unit. Retained trees should have a reasonable assurance of windfirmness and should be uniformly distributed throughout the stand, but they may be clumped for operational concerns or ecological opportunities.

Proposed harvest units in all VCUs meet the criteria for application of the Forest Plan Standards and Guidelines for marten habitat.

## **Project-specific Mitigation**

The analysis documented in this EIS discloses the possible adverse impacts that may occur from implementing the actions proposed under each alternative. Measures have been formulated to mitigate or reduce these impacts. These measures were guided by the direction from the Forest Plan previously described in this chapter and in Chapter 1.

IDT specialists use on-the-ground inventories, computer (GIS) data, and aerial photographs to prepare the documents called unit cards for each harvest unit in the unit pool for the project. Similar cards are also prepared for each segment of road. Resource specialists include their concerns on the cards and then describe how the concerns are to be mitigated (if not completely avoided) in the design of each unit and road segment. (These cards can be found in Appendix B of the Draft EIS and Appendix F of this Final EIS.) Resource concerns and mitigation measures will be refined further during final layout, when specialists have another opportunity to revise their unit and road card recommendations.

Applicable Forest Plan Standards and Guidelines, the "Best Management Practices" (BMPs) used to meet the requirements of the Clean Water Act, and site-specific mitigation measures are identified on the unit and road cards.

Several helicopter harvest units are located in the vicinity of Phocena Bay. This bay is a popular anchorage, and a recreation cabin receives moderate use during the summer months. To ensure public safety, the cabin would be closed to public use during harvest activities, and public notices of harvest activities would be placed in local publications and the Forest Service's cabin reservation system.

## Monitoring

Monitoring activities can be divided into Forest Plan monitoring and project-specific monitoring. The National Forest Management Act requires that National Forests monitor and evaluate their forest plans (36 CFR 219.11). Chapter 6 of the Forest Plan includes the monitoring and evaluation activities to be conducted as part of Forest Plan implementation. There are three categories of Forest Plan monitoring:

- Implementation monitoring: used to determine if the goals, objectives, standards and guidelines, and practices of the Forest Plan are implemented in accordance with the Forest Plan.
- Effectiveness monitoring: used to determine if the Forest Plan Standards and Guidelines, and practices, as designed and implemented, are effective in accomplishing the desired result.
- Validation monitoring: used to determine whether the data, assumptions, and estimated effects used in developing the Forest Plan are correct.

Effectiveness and validation monitoring are not typically done as part of project implementation. Implementation monitoring, and any additional project-specific monitoring, is, however, an important aspect of the project.

### Routine Implementation Monitoring

Routine implementation monitoring assesses whether the project was implemented as designed and whether or not it complies with the Forest Plan. Planning for routine implementation monitoring began with the preliminary design of harvest units and roads (see previous discussion of mitigation). The unit and road cards (Appendix B of the Draft EIS) and unit silvicultural prescriptions will be the basis for determining whether recommendations were implemented for various aspects of the Gravina Island Timber Sale project.

Routine implementation monitoring is part of the administration of a timber sale contract. The sale administrators and road inspectors ensure that the prescriptions contained on the unit and road cards, and the unit silvicultural prescriptions, are incorporated into contract documents; they then monitor performance relative to contract requirements. Input by resource staff specialists, such as fisheries biologists, soil scientists, hydrologists and engineers, is regularly requested during this implementation monitoring process. These specialists provide technical advice when questions arise during project implementation. Fish timing restrictions are monitored with site visits by the fisheries biologist during road construction activities. Patrols by law enforcement personnel and district staff would monitor for compliance and effectiveness of the road closure/barriers.

Tongass National Forest staff annually conducts a review of BMP implementation and effectiveness. The results of this and other monitoring are summarized in a Tongass National Forest Annual Monitoring and Evaluation Report. This report provides information about how well the management direction of the Forest is being carried out, and measures the accomplishment of anticipated outputs, activities and effects.



## Alternatives Considered in Detail

Six alternatives are considered in detail. Alternative 1 is the No-action Alternative, under which the project area would have no timber harvest or road construction at this time, and would remain subject to natural or ongoing changes only. The other action alternatives represent different means of satisfying the Purpose and Need, by responding with different emphases to the significant issues discussed in Chapter 1. Maps of all alternatives considered in detail are provided at the end of this chapter; larger-scale maps are contained in the project planning record.

Table 2-1  
Proposed Timber Harvest Actions for All Alternatives

Category	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
<b>Harvest Volume CCF (MBF) (excluding right-of-way)<sup>1</sup></b>	0	94,183 (39,740)	92,220 (38,748)	111,813 (47,178)	33,507 (14,198)	77,420 (31,860)
<b>Harvest Acres</b>	0	1,801	1,818	2,218	803	1,562
<b><u>Silvicultural System (acres)</u></b>						
Even-aged	0	1,135	1,100	1,244	219	937
2-aged	0	262	284	452	144	284
Uneven-aged	0	404	434	522	440	341
<b><u>Harvest System (acres)</u></b>						
Shovel	0	126	126	126	0	74
Conventional (Cable)	0	849	750	860	0	575
Helicopter	0	826	942	1,232	803	913
<b><u>Road Construction (miles)</u></b>						
Classified on NFS lands	0	17.83	14.21	16.79	0	12.57
Temporary on NFS lands	0	1.10	1.18	1.18	0	1.18
Classified on State lands	0	1.11	6.69	4.27	0	3.66
<b>Total Road Construction by FS</b>	<b>0</b>	<b>20.04</b>	<b>22.08</b>	<b>22.24</b>	<b>0</b>	<b>17.41</b>
<i>Ketchikan Gateway Borough Rd</i>	<i>N/A</i>	<i>N/A</i>	<i>1.65</i>	<i>1.65</i>	<i>N/A</i>	<i>1.65</i>
<b>Total Road Construction</b>	<b>0</b>	<b>20.04</b>	<b>23.73</b>	<b>23.89</b>	<b>0</b>	<b>19.06</b>

<sup>1</sup> Includes sawlog and utility.  
Source: 2003, 2004

### Alternative 1 (No Action)

Alternative 1 proposes no new timber harvest or road construction. It does not preclude timber harvest from other areas, or from Gravina Island at some time in the future. The Council on Environmental Quality (CEQ) regulations (40 CFR 1502.14d) require that a "No Action" alternative be analyzed in every EIS. The No-action Alternative provides a benchmark that allows the decision makers to compare the magnitude of the environmental effects of the action alternatives with the current condition. The map for Alternative 1 shows the current Forest Plan Land Use Designations.

This alternative would address subsistence use and roadless character (Issues B and D), by having no adverse effects on old-growth associated wildlife, subsistence and traditional uses, scenic views, roadless characteristics, and the marine environment. It would not provide for an economic timber supply (Issue A, see Chapter 1), nor would it provide new recreational access to the island (Issue C). This alternative would leave the small Old-growth Reserves in their original locations.

Alternative 1 would defer moving the project area toward the desired future condition described in the Forest Plan. The existing condition would continue to be influenced by natural disturbance processes and activities on other ownerships.

## Alternative 2

### Objectives

Alternative 2 was designed to address the issue of timber supply and economics (Issue A). It emphasizes positive economics by maximizing the number of units harvested by conventional cable systems and limiting the number of helicopter units to those with short flight distances.

The three small Old-growth Reserves would be modified as recommended by the interagency committee.

### Timber Harvest

This alternative would harvest 94,183 CCF (39.7 MMBF) of timber from 56 units (Table 2-1, Alternative Map 2 at the end of this chapter). The timber would be removed by helicopter, cable and shovel logging. It would convert 1,135 acres of old-growth stands to an even-aged condition, convert 262 acres to a two-aged condition, and convert 404 acres of old-growth stands to an uneven-aged condition.

### Transportation System

To access harvest units, Alternative 2 includes construction of 20.0 miles of new road, including approximately 1.1 miles of road across State of Alaska, Department of Natural Resource lands that would require an easement. Logs would be transported to a new log transfer facility, to be constructed on NFS lands at Bostwick Inlet. The log transfer facility would be decommissioned, with the bulkhead and rock ramp removed after post-harvest silvicultural activities. Logs would also be flown to log drops located around the south end of Gravina. The exact location of these log drops would be determined by the purchaser and require a State permit.

All project roads would be closed upon completion of harvest activities. A gate would be installed on the 8100000 mainline road, near the Bostwick LTF on National Forest System land, and an administrative closure would be enforced. Only necessary administrative use, such as regeneration surveys, thinning, and future timber sales, would be allowed. Roads would be maintained at Maintenance Level 1 (closed), where custodial maintenance is performed to protect the road investment and keep damage to adjacent resources to an acceptable level. This would include the replacement of drainage pipes (culverts) with storm-proofed ditches and drainage features. Temporary roads would be decommissioned (permanently closed). Non-motorized travel would not be restricted.

## Alternative 3

### Objectives

Alternative 3 was designed to respond to the subsistence issue (Issue B), which identified concerns for maintaining marine habitat in Bostwick Inlet and deer hunting throughout the island. Timber harvest and road construction were reduced in areas of popular subsistence use, high-value deer winter range, and in some headwater stream systems.

The three small Old-growth Reserves would be modified as recommended by the interagency committee.

### Timber Harvest

This alternative would harvest 92,220 CCF (38.8 MMBF) of timber from 60 units (Table 2-1, Alternative Map 3 at the end of this chapter). The timber would be removed by helicopter, cable and shovel logging. It would convert 1,100 acres of old-growth stands to an even-aged condition, convert 284 acres to a two-aged condition, and convert 434 acres of old-growth stands to an uneven-aged condition.

### Transportation System

To access harvest units, Alternative 3 includes construction of 22.1 miles of new road, including 6.7 miles of road across DNR, Mental Health Trust, and Ketchikan Gateway

## 2 Alternatives

Borough lands that would require an easement. The NFS-built road system would connect with an additional 1.6 miles of new road, planned to be built by the Borough, to reach the existing log transfer facility at the Pacific Log and Lumber sawmill on the Tongass Narrows. Logs would also be flown to log drops located around the south end of Gravina. The exact location of these log drops would be determined by the purchaser and require a State permit.

All project roads would be closed upon completion of harvest activities. A gate would be installed on the 8100000 mainline road, near the NFS boundary on National Forest System land, and an administrative closure would be enforced. Only necessary administrative use, such as regeneration surveys, thinning, and future timber sales, would be allowed. Roads would be maintained at Maintenance Level 1 (closed), where custodial maintenance is performed to protect the road investment and keep damage to adjacent resources to an acceptable level. This would include the replacement of drainage pipes (culverts) with storm-proofed ditches and drainage features. Temporary roads would be decommissioned (permanently closed). Non-motorized travel would not be restricted.

### Alternative 4 (Proposed Action)

#### Objectives

Alternative 4 was the original proposed action in the Draft EIS. It was designed to address timber supply and economics and provide roaded access to NFS lands on Gravina Island (Issues A and C). It would provide the largest volume of timber and the greatest number of jobs of the action alternatives, but is less cost-effective than Alternative 2 because of increased road construction and helicopter yarding. It would also maintain a portion of the logging road system as open post-harvest, to provide roaded access for recreational purposes.

The three small Old-growth Reserves would be modified as recommended by the interagency committee.

#### Timber Harvest

This alternative would harvest 111,813 CCF (47.2 MMBF) of timber from 79 units (Table 2-1, Alternative Map 4 at the end of this chapter). The timber would be removed by helicopter, cable and shovel logging. It would convert 1,244 acres of old-growth stands to an even-aged condition, convert 452 acres to a two-aged condition, and convert 522 acres of old-growth stands to an uneven-aged condition.

#### Transportation System

To access harvest units, Alternative 4 includes construction of 22.2 miles of new road, including 4.3 miles of road across DNR, Mental Health Trust, and Ketchikan Gateway Borough lands that would require an easement. The NFS-built road system would connect with an additional 1.6 miles of new road, planned to be built by the Borough, to reach the log transfer facility at the Pacific Log and Lumber sawmill on the Tongass Narrows. Logs would also be flown to log drops located around the south end of Gravina Island. The exact location of these log drops would be determined by the purchaser and require a State permit.

After completion of harvest, the 8100000 and 8105000 mainline roads (15.6 miles) would remain open to provide roaded recreational opportunities. The remaining classified roads would be closed, and temporary roads would be decommissioned, as described for Alternatives 2 and 3.

### Alternative 5

#### Objectives

Alternative 5 was designed to emphasize retention of the roadless character of the island by not building any new roads (Issue D). All timber would be harvested with helicopter harvest systems, and flown to log drops. Consequently, the only units selected in this alternative are those accessible from salt water, in the southern and eastern portions of the project area.

The three small Old-growth Reserves would be modified as recommended by the interagency committee.



## Timber Harvest

This alternative would harvest 33,507 CCF (14.2 MMBF) of timber from 36 units (Table 2-1, Alternative Map 5 at the end of this chapter). The timber would be removed entirely by helicopter harvest systems. It would convert 219 acres of old-growth stands to an even-aged condition, convert 144 acres to a two-aged condition, and convert 440 acres of old-growth stands to an uneven-aged condition.

## Transportation System

In this alternative, all harvested timber would be flown to log drops located around the south end of Gravina Island, so no log transfer facilities and no new road construction would be needed. Log drops would be the same as described for Alternatives 2 and 3. The exact location of these log drops would be determined by the purchaser and require a State permit.

## Objectives

Alternative 6 was designed to emphasize water quality and protection of important fish and wildlife subsistence values (Issue B). Timber harvest and road construction in high-value deer winter range and in some headwater stream systems are minimized. It was also designed to offer a volume intermediate between Alternatives 3 and 5, to improve the range of volumes being analyzed.

The three small Old-growth Reserves would be modified as recommended by the interagency committee.

## Timber Harvest

This alternative would harvest 77,420 CCF (31.9 MMBF) of timber from 52 units (Table 2-1, Alternative Map 6 at the end of this chapter). The timber would be removed by helicopter, cable and shovel logging. It would convert 937 acres of old-growth stands to an even-aged condition, convert 284 acres to a two-aged condition, and convert 341 acres of old-growth stands to an uneven-aged condition.

## Transportation System

To access harvest units, Alternative 6 includes construction of 17.4 miles of new road, including approximately 3.7 miles of road across State DNR, Mental Health Trust, and Ketchikan Gateway Borough lands that would require an easement. The NFS-built road system would connect with an additional 1.6 miles of new road, planned to be built by the Borough, to reach the log transfer facility at the Pacific Log and Lumber sawmill on the Tongass Narrows. Log drops and post-harvest road management would be the same as described for Alternative 3.

## Alternative 6

### Alternatives Considered but Eliminated from Detailed Study

Several project options were considered during the planning process, but have not been included in the EIS for detailed study. These are described briefly below, along with the reasons for not considering them further.

An alternative that would construct a log transfer facility at Vallenar Bay was considered. This option was dropped for several reasons: 1) use of an LTF at Vallenar Bay would require 6.5 miles of road across multiple ownerships, and 2) there is little commercial timber on the Vallenar Bay side of the project.

Several commenters suggested an alternative that involved no clearcutting. This was not considered in detail due to economic concerns and because many stands are not favorable to uneven-aged management due to windthrow potential and disease infestations. The Forest Plan and the Forest Service Chief's directive (1992) allow for use of clearcutting in these situations where the even-aged management will better meet the goals and objectives of the land use designation.

Other commenters suggested an alternative that harvested additional timber from the suitable timber base. This alternative was considered and eliminated during the development of alternatives for the Draft EIS. As stated in the Draft EIS, approximately 6,802 acres of suitable forest that met Forest Plan Standards and Guidelines could have been included in the potential unit pool. Approximately 4,584 acres were not included in any of the alternatives because the units would have been too small to harvest economically, the risk to resources was too high for the volume harvested, or the unit was too far from other areas to harvest economically.



## Comparison of Alternatives by Issue

This section compares outputs, objectives and effects of the alternatives in terms of the significant issues for the Gravina Island Timber Sale project. The discussions of effects are summarized from Chapter 3, which should be consulted for a full understanding of these and other environmental consequences. The table below provides an overview comparison of information from the alternative descriptions and Chapter 3 relevant to the issues. This information will be used in the discussions that follow.

Table 2-2  
Comparison of Alternatives by Issue

	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
<b>Issue A: Timber Economics</b>						
Road construction (millions \$)	0	4.0	4.4	4.4	0	3.5
LTF construction (\$)	0	180,000	0	0	0	0
Total logging cost (\$/CCF) <sup>1</sup>	0	169.49	182.73	178.21	200.51	178.77
Net stumpage value (\$/CCF) <sup>2</sup>	0	20.16	5.62	12.57	(5.39)	2.33
Direct employment (jobs/yr) <sup>2</sup>	0	249	243	295	88	204
<b>Issue B: Subsistence</b>						
Possibility of significant restriction	No	Yes	Yes	Yes	No	Yes
Reduction in existing deer habitat capability	0	9%	8%	11%	5%	5%
Potential activity in Bostwick Inlet <sup>3</sup>	None	LTF & Barge	Barge	Barge	Barge	Barge
<b>Issue C: Access Management</b>						
Road construction (total miles) <sup>4</sup>	0	20.04	22.08	22.24	0	17.41
Road miles open to motorized vehicles in the project area (FS construction)	0	0	0	15.6	0	0
One-time cost to close road	0	345,400	343,800	99,000	0	273,300
Annual cost to maintain roads	0	6,842	6,873	19,993	0	5,411
<b>Issue D: Roadless Character</b>						
Reduction in roadless area from harvest and roads (percent)	0	25	20	24	0	19
<b>Concern: Fish Habitat and Water Quality</b>						
Class I and II stream crossings	0	16	14	15	0	12
Class III stream crossings <sup>5</sup>	0	12	9	12	0	9
<b>Concern: Small Old-growth Reserves</b>						
Modification implemented	0	Yes	Yes	Yes	Yes	Yes
<b>Concern: Scenic Integrity</b>						
Viewsheds meeting higher VQO than Forest Plan S&G, post timber harvest <sup>6</sup>	12	6	5	5	6	5

<sup>1</sup> With optional removal of utility logs

<sup>2</sup> Expected value at current market conditions, NEAT, Second Quarter 2003

<sup>3</sup> Helicopter units may utilize barging locations in the vicinity of Bostwick Inlet.

<sup>4</sup> Road mileage includes all temporary and classified roads.

<sup>5</sup> In the Draft EIS, Class IV stream crossings were included with Class III. They are omitted in the Final EIS.

<sup>6</sup> Viewsheds will meet a standard higher than required in the Forest Plan, post timber harvest, e.g. if the Forest Plan VQO is Modification and the proposed harvest in a viewshed meets a Partial Retention VQO, then the VQO met is higher than the Forest Plan S&G.

Source: 2003, 2004

# 2 Alternatives

## Issues

### Issue A: Timber Economics

Alternative 2 provides the most cost-effective supply of timber on a cost/CCF basis. Alternative 4 provides the largest amount of timber and the greatest number of jobs but is less cost effective because of increased road construction and helicopter yarding. Alternative 5 provides the least amount of timber, and because it uses helicopter logging exclusively, carries the highest logging cost per CCF. Alternative 3 is slightly more cost effective than Alternative 4. Alternative 6 is more cost effective than Alternative 5. The No-action Alternative harvests no timber.

### Issue B: Subsistence

**Protection of the marine habitat of Bostwick Inlet:** Alternative 1 presents the best option for protecting and retaining the marine subsistence resources of Bostwick Inlet, because no activity would occur in the vicinity of the inlet. All of the action alternatives would have log drops likely occurring in Bostwick Inlet. This may temporarily affect the marine environment. Of the action alternatives, Alternative 6 would have the least impact, as no timber harvest would occur in the Bostwick watershed. Alternative 3 would have the second-least impact, and Alternative 5 the third-least, with progressively more timber harvest occurring in the Bostwick watershed. Alternative 4, which proposes an open road system, could also change how and when the marine life in Bostwick is harvested. Proposed road 8105-1 would approach within 0.4 mile of Bostwick Inlet; it may encourage additional or seasonally increased use of subsistence resources in the vicinity of Bostwick Inlet, and it could have the greatest long-term effect on subsistence uses in the area. Alternative 2 would potentially cause the greatest immediate change in the marine environment of Bostwick Inlet, by building an LTF in the inlet and a road to the LTF.

**Subsistence use of deer on Gravina Island:** All action alternatives would create openings that can affect forage and deer populations. Deer habitat capability would be reduced under all action alternatives, but under no alternatives would it be reduced such that significant restrictions of subsistence use of deer would be anticipated. Alternative 4 would cause the greatest reduction in deer habitat capability, followed, in order of decreasing impact, by Alternatives 2, 3, 5, 6, and 1. However, the increased access from the open road system proposed in Alternative 4 could increase competition for, and harvest of, deer by both rural and nonrural hunters. This could result in the possibility of a significant restriction of subsistence use of deer on Gravina Island, given current deer harvest regulations. Alternatives 2, 3, and 6, which build roads but close them after the sale, could also result in the possibility of a significant restriction of subsistence use of deer, by providing increased walk-in access on the closed roads. Alternatives 5 and 1 would have the least affect by building no roads. If regulations were changed to limit non-rural hunting, an open road system could benefit subsistence hunters by providing increased access to deer.

### Issue C: Access Management

One concern with access was to increase roaded access on Gravina Island for timber harvest and recreational and hunting opportunities. (Maintenance of the roadless character is discussed under Issue D.) Alternatives 1 and 5 would not build any roads and the island would remain in an unroaded condition on National Forest System lands. Alternatives 2, 3, and 6 would build classified roads only to harvest the timber, then close them (Maintenance Level 1) following harvest activities. These roads would be available for non-motorized access. Alternative 4 would provide long-term roaded access on Gravina Island, with construction of 21.06 miles of classified road, of which 15.6 miles would remain open after the sale. The remainder would be closed (Maintenance Level 1) and put in storage.

Another concern with access was the cost of construction and maintenance of the road system. Alternatives 1 and 5 would not construct any roads. Alternatives 2, 3, 4, and 6 would construct a new road system across State lands to access NFS lands on Gravina Island. The relative costs of construction, closure, and maintenance are directly related to the length of road being built; closing a road is more costly initially than maintaining it as open, but the annual maintenance

for open roads is higher than for closed roads. In road construction costs, Alternative 4 would be the most expensive, followed by Alternatives 3, 2, 6, and 5 (in which no road system would be built). In road closure and maintenance, Alternative 4 would initially be less expensive than Alternatives 3, 2, and 6, and in subsequent years would be more expensive.

## **Issue D: Roadless Character and Wilderness Eligibility**

With the exception of the airport, and an overgrown road in the Vallendar watershed, Gravina Island is basically unroaded. Given the heightened interest in roadless areas, building new roads on Gravina Island is a concern nationally and locally. Many comments were received favoring no new road construction, while others preferred that roadless areas be recommended for wilderness designation.

Alternative 1 is the only alternative that would defer management in the Gravina Island Roadless Area. Alternative 5 would not build any roads, harvesting completely by helicopter. Alternatives 2, 3, 4, and 6 would significantly reduce the size of the roadless area by constructing new roads and isolating portions of the roadless area that would not meet the minimum size criteria of 5,000 acres.

## **Other Concerns**

### **Concern: Fish Habitat and Water Quality**

Alternative 1 would have the least potential for effect on fish habitat. Of the action alternatives, Alternative 5 would have the least potential effect by constructing no new stream crossings, and Alternative 4 the greatest potential effect by constructing 36 stream crossings on National Forest System lands.

### **Concern: Small Old-growth Reserves**

All action alternatives would implement the modification of the small Old-growth Reserves as recommended in the interagency review. Alternative 1 does not propose a change to the small Old-growth Reserves.

### **Concern: Scenic Integrity**

Twelve viewsheds were analyzed for impacts from the timber harvest proposed in the action alternatives. Under all alternatives, all twelve viewsheds would meet Forest Plan Standards and Guidelines. Currently, all twelve viewsheds meet higher Visual Quality Objectives than required by Forest Plan Standards and Guidelines. Alternative 1 would cause no change to the visual integrity of the island. Alternatives 2 and 5 would retain six viewsheds in a condition meeting higher Visual Quality Objectives than required by Forest Plan Standards and Guidelines, while Alternatives 3, 4, and 6 would retain five viewsheds in this higher condition.

## 2 Alternatives

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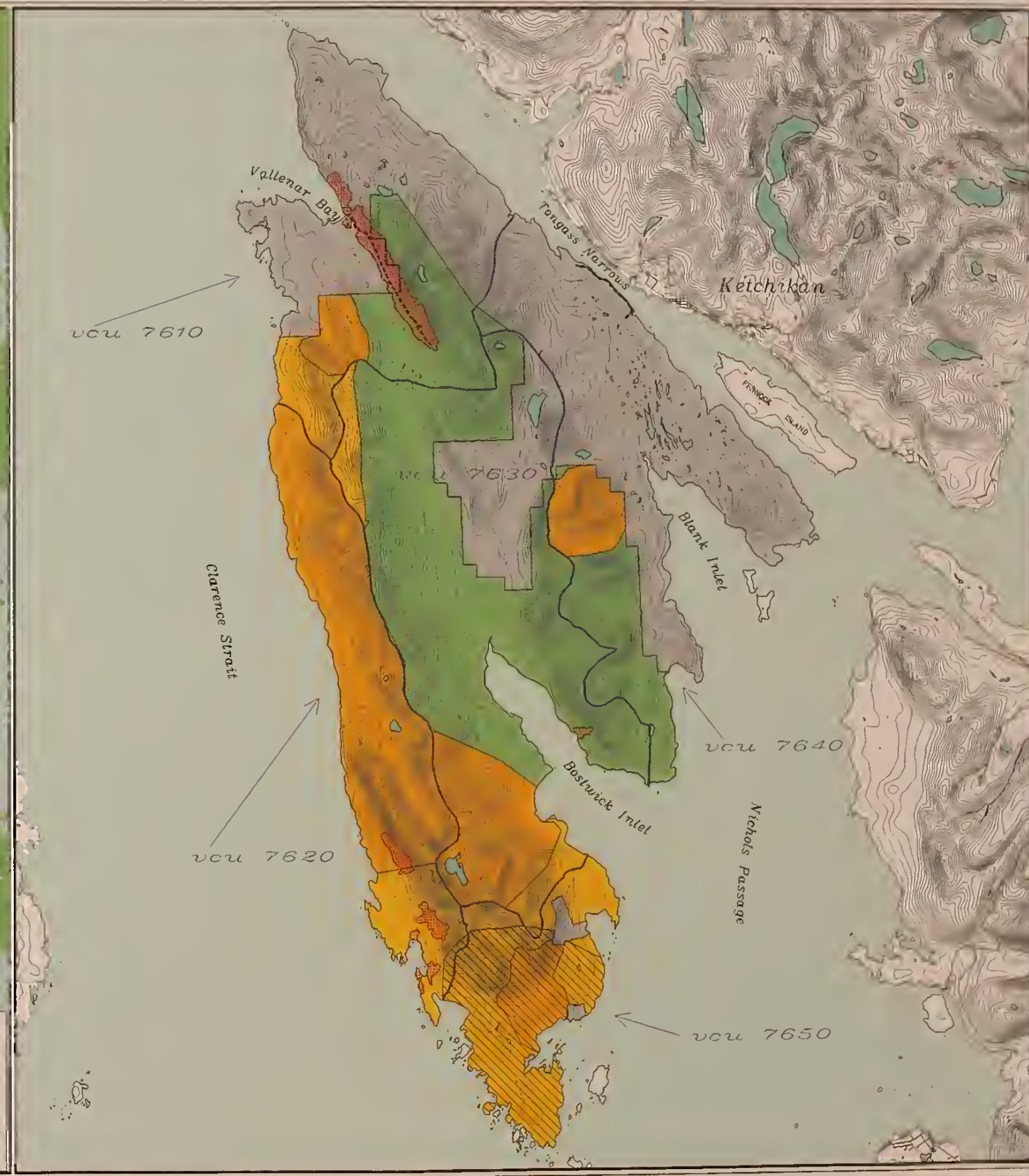




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June 04, 2002 Al Grundy



**Gravina Existing Conditions  
(Alternative 1)  
NO ACTION**

- Salt Water
- Lakes/Ponds
- Scenic Viewshed (SV) Moderate Development
- Timber Production (TM) Maximum Development
- Minerals Intensive Development
- Old Growth Reserves (OG) at Current Locations Natural Setting
- Non-NFS Land (NNF)
- Non-Project Areas
- Previously Harvested
- Existing Roads
- Project Area VCU Boundaries

Contour Interval = 100 feet

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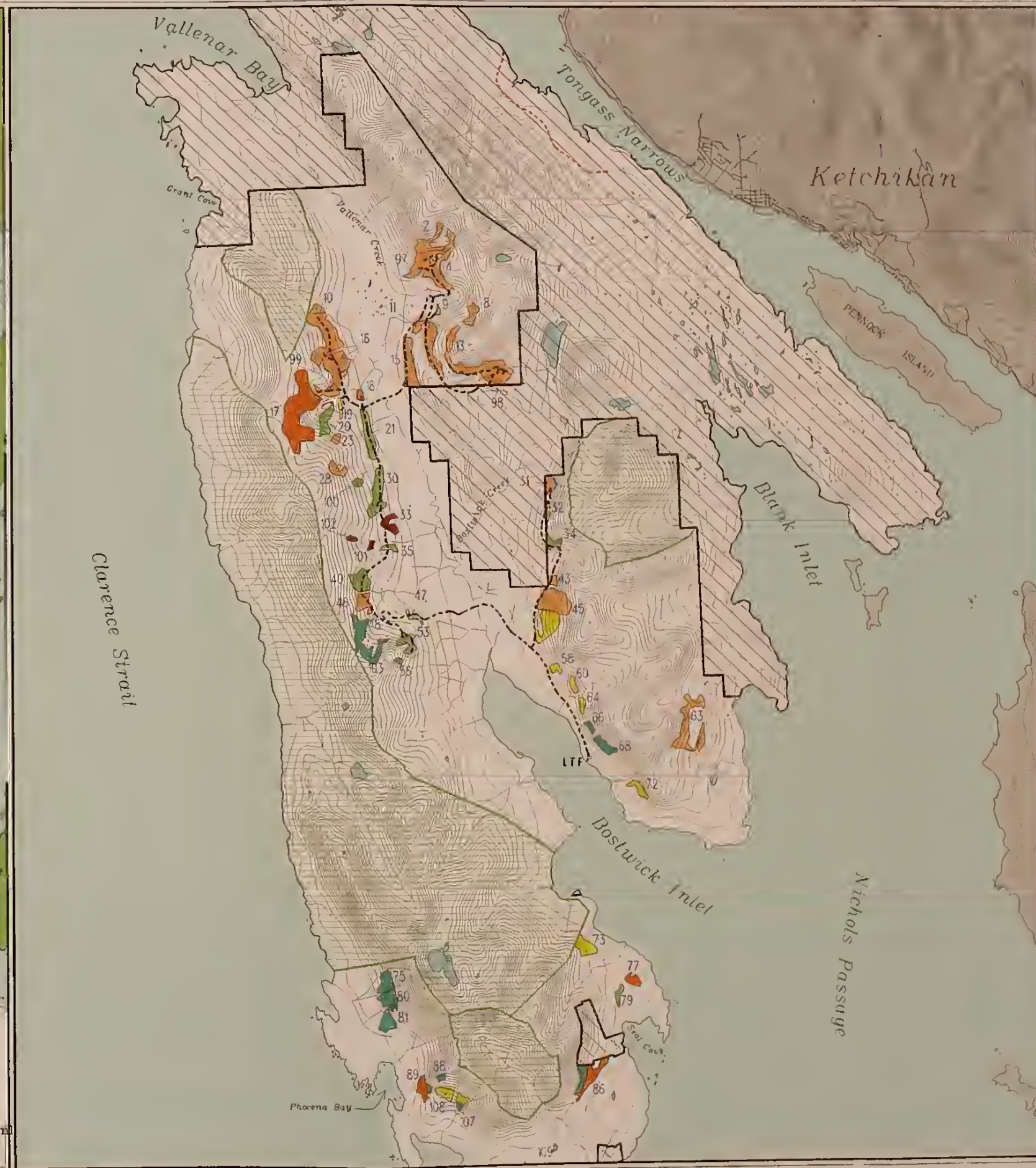




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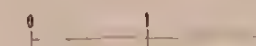


## Alternative 2

- 101 Proposed gate location
- LTF Log Transfer Facility
- Project Area
- Non-NFS Ownership
- Recommended Old Growth Reserve Locations
- Group Selection Harvest Rx
- Single Tree Selection Harvest Rx
- 2 aged Clearcut w/ Reserves Harvest Rx
- Clearcut Harvest Rx
- Clearcut w/ Reserves Harvest Rx
- Seed Tree Cnt Harvest Rx
- Salt Water
- Lakes/Ponds
- Proposed Roads to be Constructed
- Approximate Location of NON-NFS Constructed Road from Airport to Seley's Gravina Mill Site (PROPOSED)
- Class I stream
- Class II stream
- Class III stream

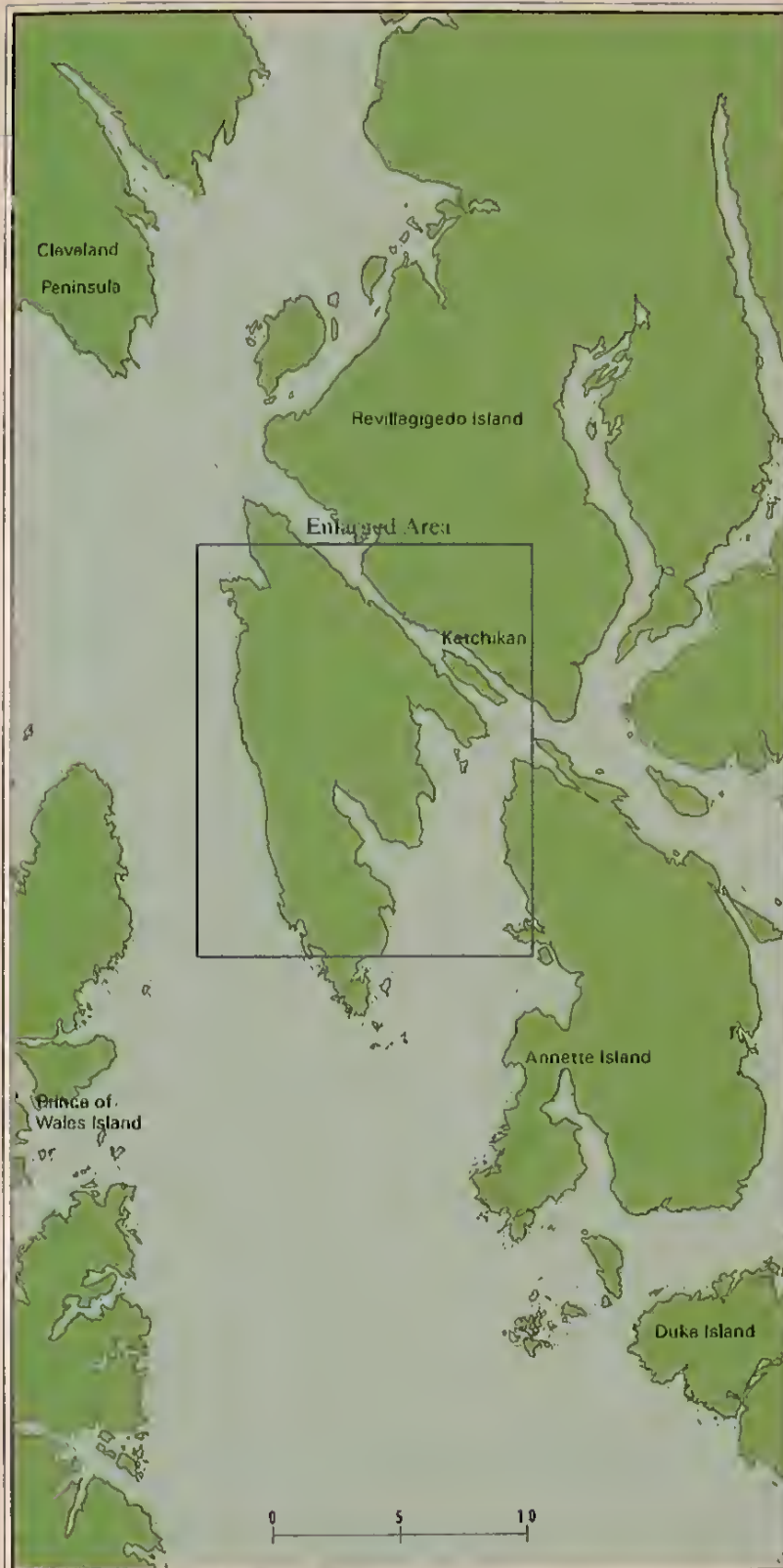


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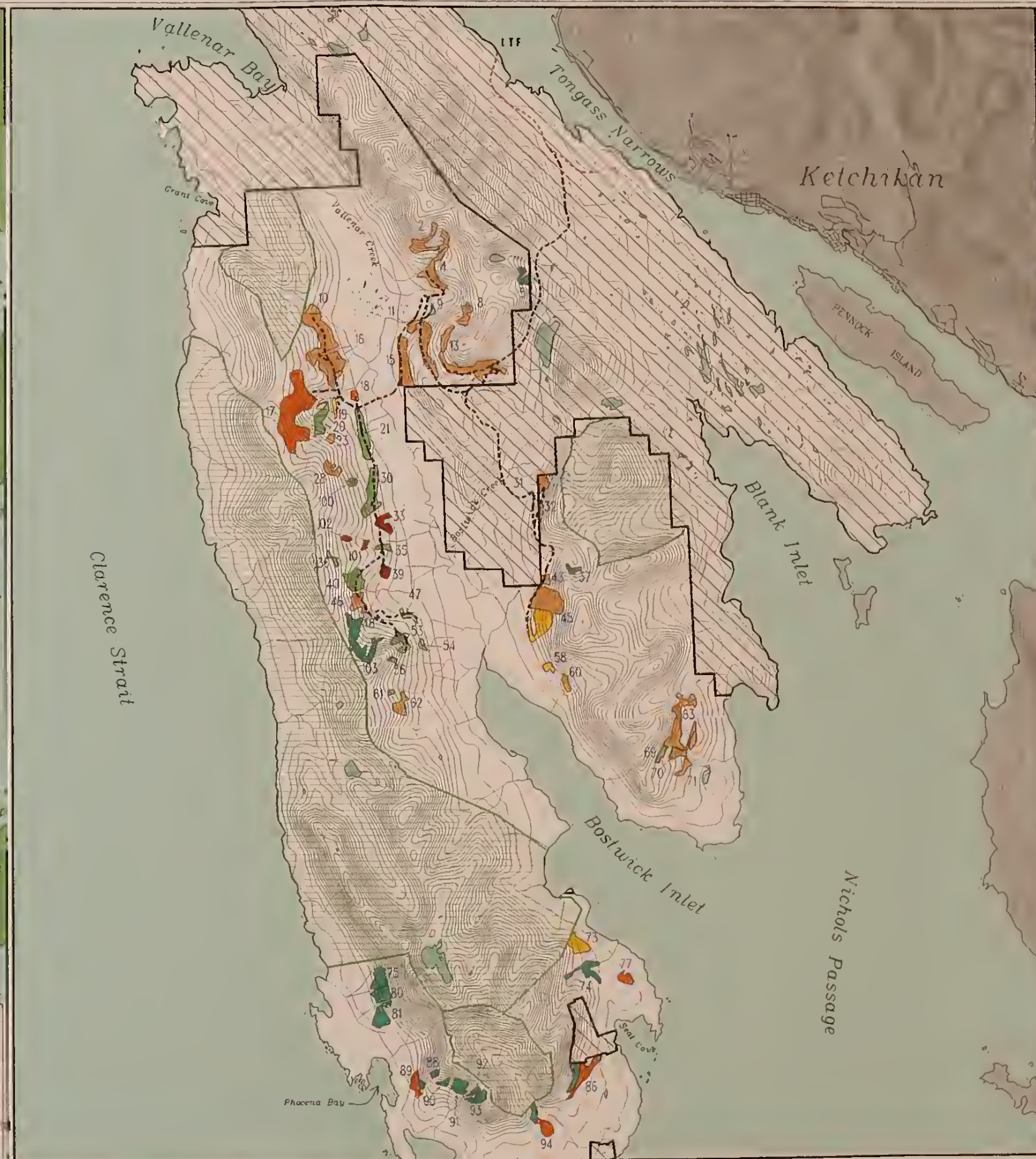




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### Alternative 3

- 101 Proposed gate location
- Unit Number
- LTFF Log Transfer Facility
- Project Area
- Non - NFS Ownership
- Recommended Old Growth Reserve Locations
- Group Selection Harvest Rx
- Single Tree Selection Harvest Rx
- 2 aged Clearcut w/ Reserves Harvest Rx
- Clearcut Harvest Rx
- Clearcut w/ Reserves Harvest Rx
- Seed Tree Cut Harvest Rx
- Salt Water
- Lakes/Ponds
- Proposed Roads to be Constructed
- Approximate Location of NON - NFS Constructed Road from Airport to Seely's Gravina Mill Site (PROPOSED)
- Class I stream
- Class II stream
- Class III stream

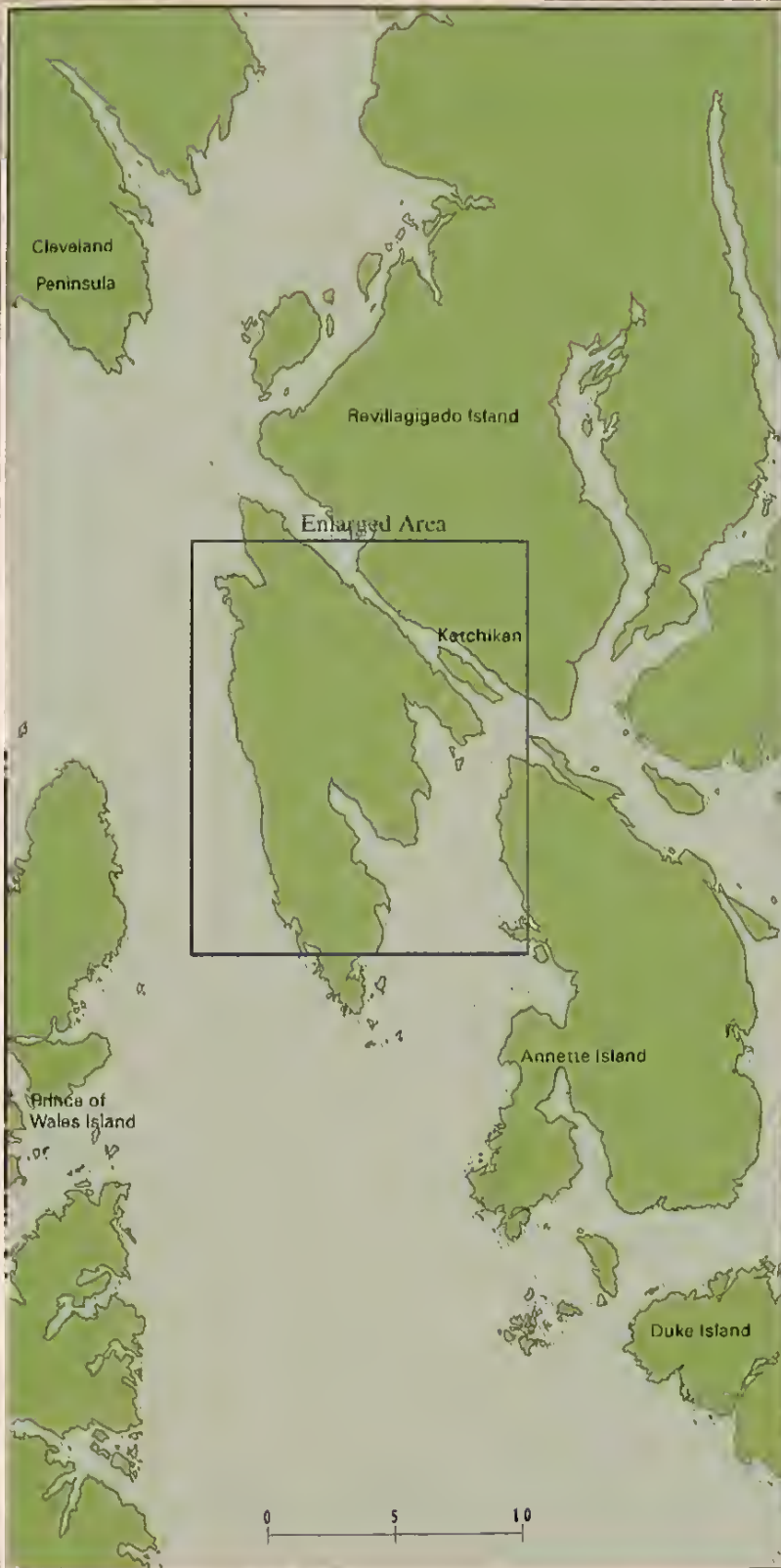


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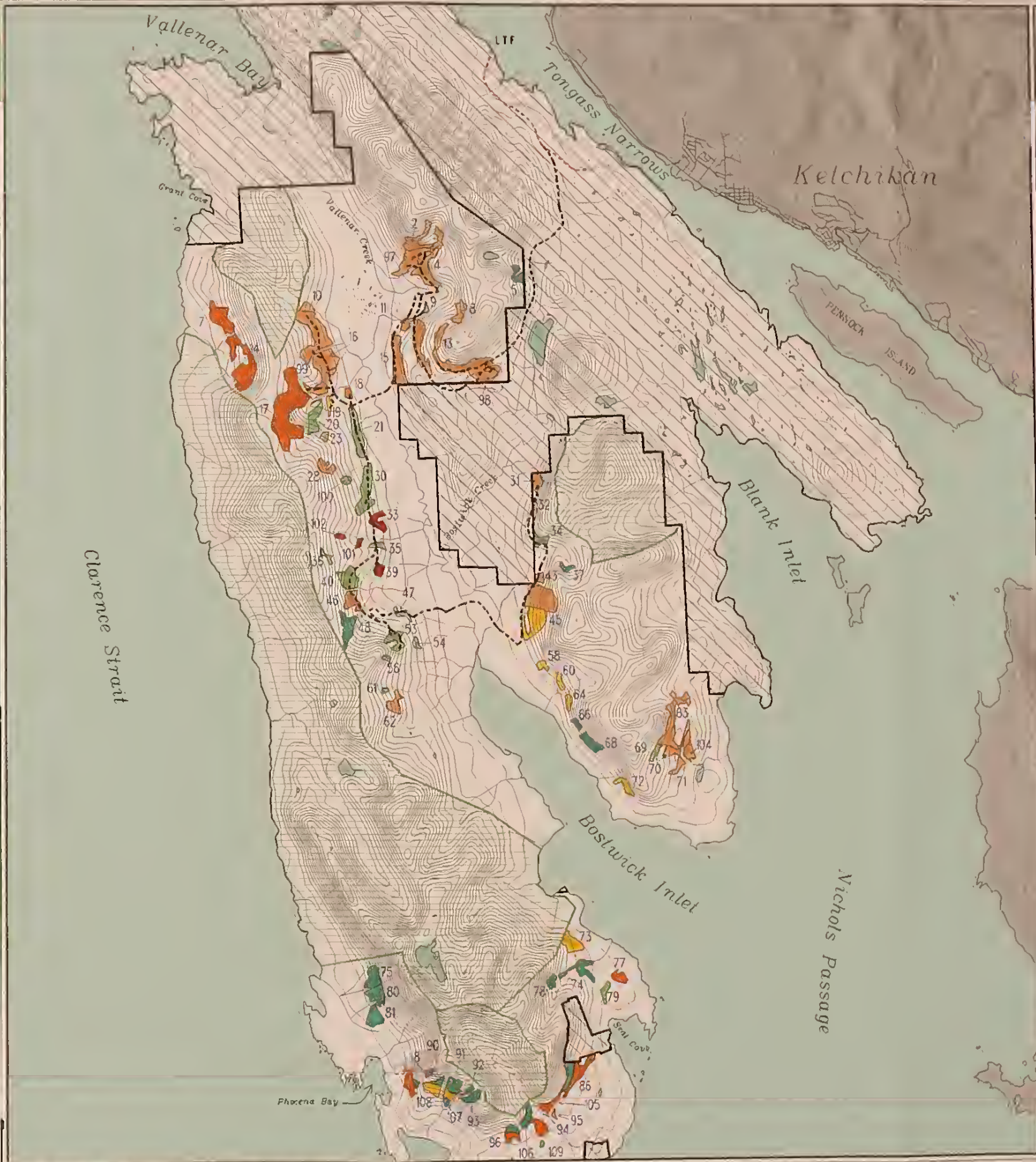






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# Alternative 4

- Proposed gate location
- Unit Number
- Log Transfer Facility
- Project Area
- Non - NFS Ownership
- Recommended Old Growth Reserve Locations
- Group Selection Harvest Rx
- Single Tree Selection Harvest Rx
- 2 aged Clearcut w/ Reserves Harvest Rx
- Clearcut Harvest Rx
- Clearcut w/ Reserves Harvest Rx
- Seed Tree Cut Harvest Rx
- Salt Water
- Lakes/Ponds
- Proposed Roads to be Constructed
- Approximate Location of NON - NFS Constructed Road from Airport to Seley's Gravina Mill Site (PROPOSED)
- Class I stream
- Class II stream
- Class III stream



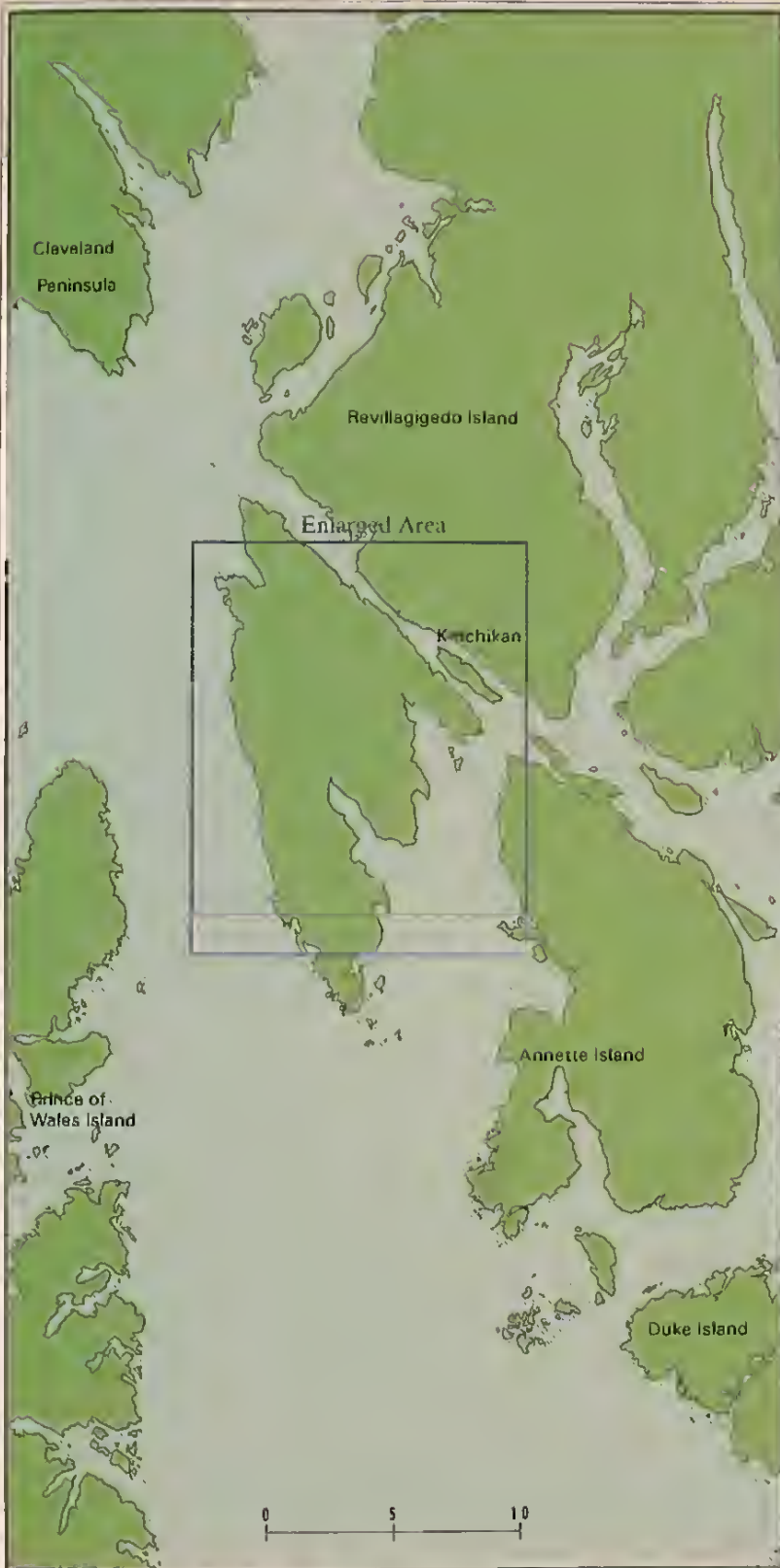
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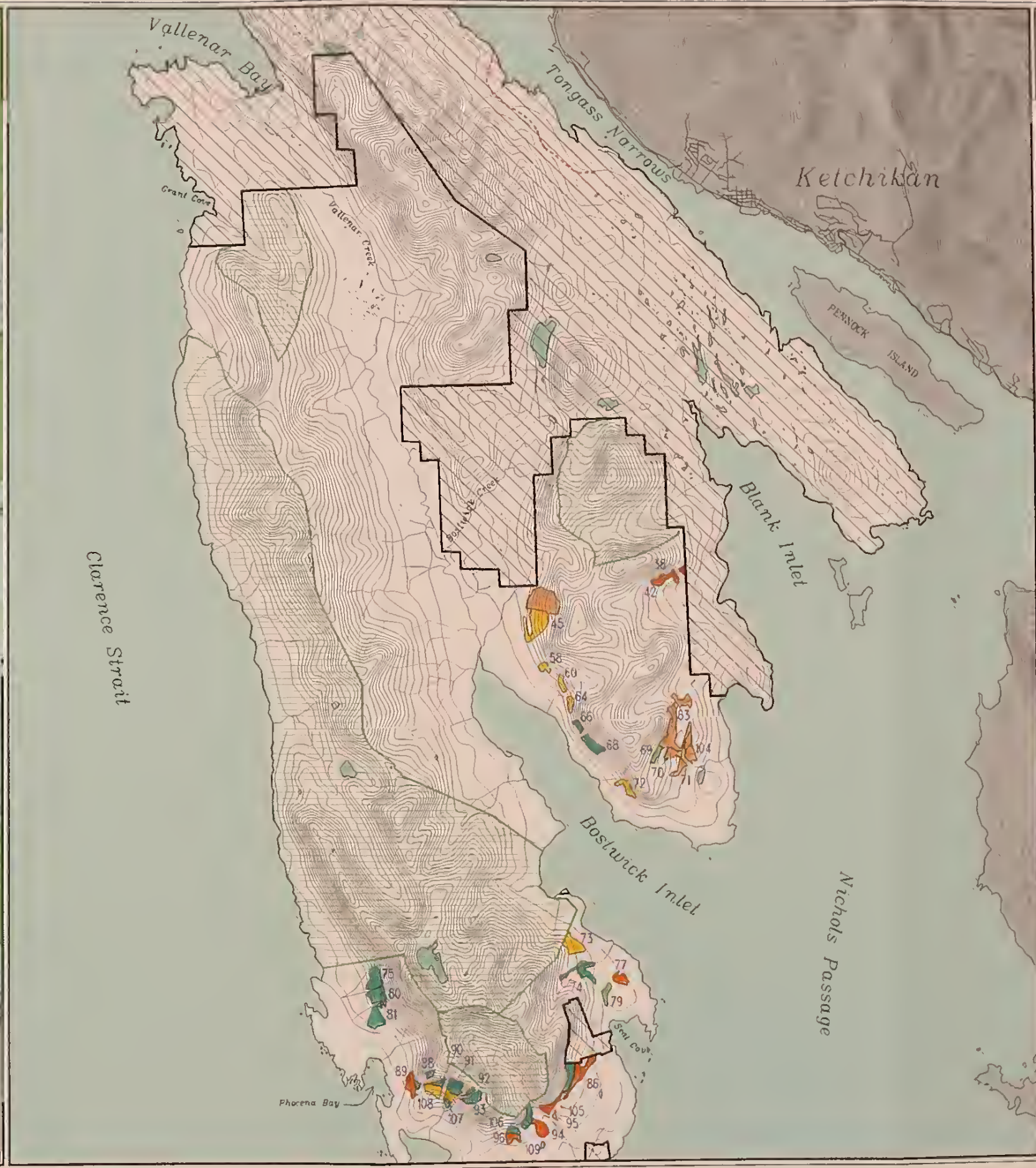






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## Alternative 5

101 Unit Number  
LTF Log Transfer Facility

Project Area

Non - NFS Ownership

Recommended Old Growth Reserve Locations

Group Selection Harvest Rx

Single Tree Selection Harvest Rx

2 aged Clearcut w/ Reserves Harvest Rx

Clearcut Harvest Rx

Clearcut w/ Reserves Harvest Rx

Seed Tree Cut Harvest Rx

Salt Water

Lakes/Ponds

Proposed Roads to be Constructed

Approximate Location of NON - NFS Constructed Road from Airport to Seley's Gravina Mill Site (PROPOSED)

Class I stream

Class II stream

Class III stream

Contour Interval = 100 feet



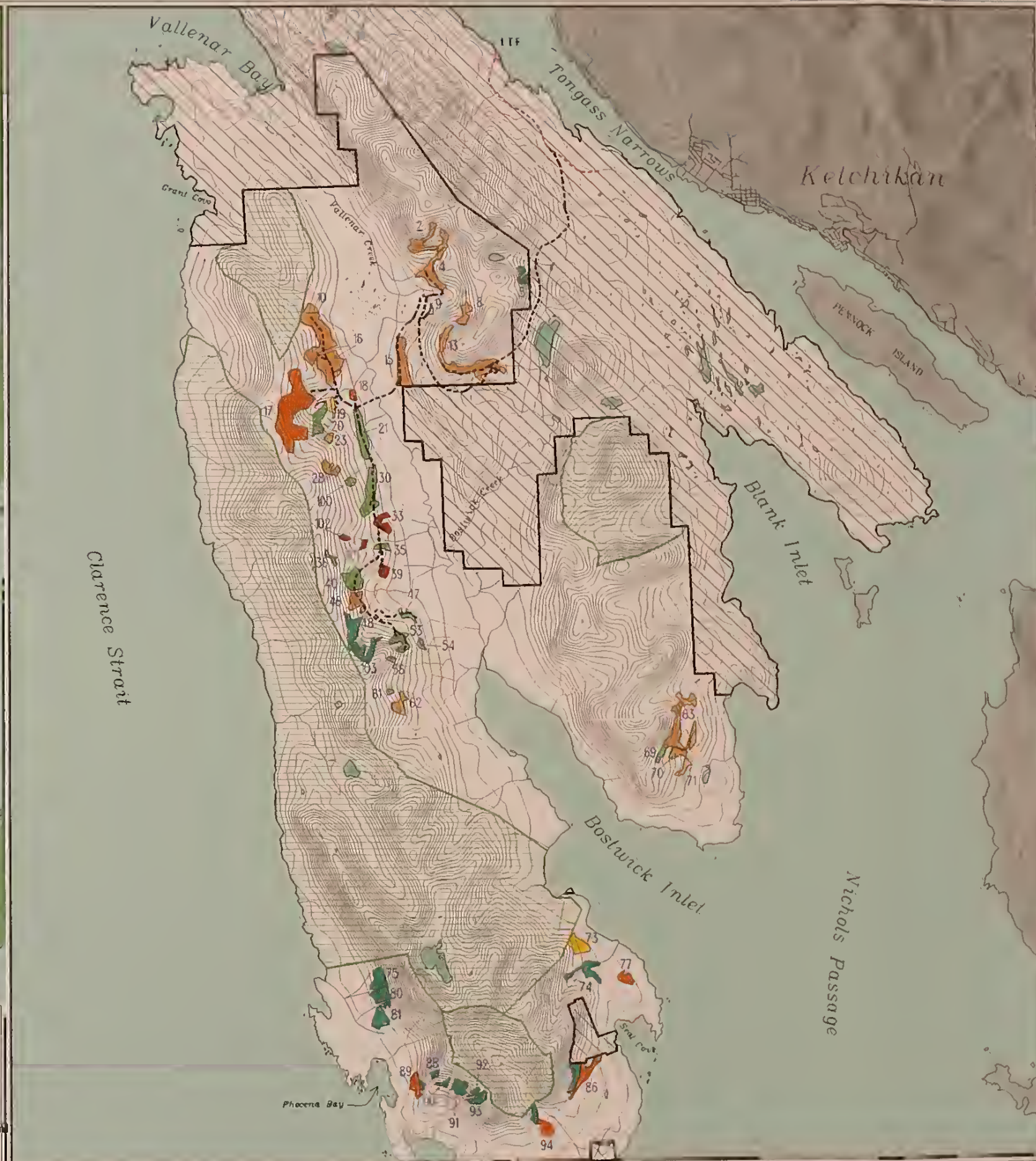




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#### Alternative 6

- 101 Proposed gate location
- Unit Number
- LTIF Log Transfer Facility
- Project Area
- Non - NTS Ownership
- Recommended Old Growth Reserve Locations
- Group Selection Harvest Rx
- Single Tree Selection Harvest Rx
- 2 aged Clearcut w/ Reserves Harvest Rx
- Clearcut Harvest Rx
- Clearcut w/ Reserves Harvest Rx
- Seed Tree Cut Harvest Rx
- Salt Water
- Lakes/Ponds
- Proposed Roads to be Constructed
- Approximate Location of NON - NFS Constructed Road from Airport to Seley's Gravina Mill Site (PROPOSED)
- Class I stream
- Class II stream
- Class III stream



Contour Interval - 100 feet









# **Chapter 3**

## **Affected Environment and Environmental Consequences**

# Chapter 3

## Human Development and Environmental Consequences

# Chapter 3

## Affected Environment and Environmental Consequences

### Introduction

This chapter provides information concerning the existing environment of Gravina Island and potential environmental consequences of the proposed action and alternatives to it. It also presents the scientific and analytical basis for the comparison of alternatives presented in Chapter 2.

Effects are quantified where possible, and qualitative discussions are also included. The means by which potential adverse effects will be reduced or mitigated are described (see also Unit and Road cards, Appendix B of the Draft EIS).

The discussions of resources and potential effects take advantage of existing information included in the Tongass Forest Plan Final EIS, other project EISs, project-specific resource reports and related information, and other sources as indicated. Where applicable, such information is briefly summarized and referenced to minimize duplication. The planning record for the Gravina Island Timber Sale EIS includes all project-specific information, including resource reports and other results of field investigations. The record also contains information resulting from public involvement efforts. The planning record is located at the Ketchikan-Misty Fjords Ranger District Office in Ketchikan, Alaska, and is available for review during regular business hours.

### Land Divisions

The land area of the Tongass National Forest has been divided in several different ways to describe the different resources and allow analysis of how they may be affected by Forest Plan and project-level decisions. These divisions vary by resource since the relationship of each resource to geographic conditions and zones also varies. The allocation of Forest Plan land use designations (LUDs) (discussed in Chapter 1) is one such division. Other divisions important for the effects analysis are described briefly here.

### Project Area

The project area is identified by the Interdisciplinary Team (IDT) to define the boundary of the area in which the project will occur. For the Gravina Island Timber Sale project, the entire island was designated as the project area, and the analysis was focused primarily on National Forest System lands on the island.

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## Value Comparison Units (VCUs)

These are distinct geographic areas, each encompassing a drainage basin containing one or more large stream systems. The boundaries usually follow major watershed divides. Gravina Island includes VCUs 7610, 7620, 7630, 7640 and 7650. Chapter 2 includes a map showing their location (Alternative 1 – Existing Condition Map).

## Wildlife Analysis Areas (WAAs)

These are land divisions used by the Alaska Department of Fish and Game to report community harvests of selected wildlife species. WAA 101 is all of Gravina Island. Information estimated by WAA is used in the wildlife and subsistence analyses.

## Watershed

Watershed refers to the area that contributes water to a drainage or stream, or to that portion of a landscape in which all surface water drains to a common point. Watersheds can range from tens of acres that drain a single small intermittent stream to many thousands of acres for a stream that drains hundreds of connected intermittent and perennial streams. Six watersheds were analyzed on Gravina Island (Figure 3-4).

## Inventoried Roadless Area

Inventoried Roadless Areas are undeveloped areas typically exceeding 5,000 acres that met the minimum criteria for wilderness consideration under the Wilderness Act and that were inventoried during the Forest Service's Roadless Area Review and Evaluation (RARE II) process, subsequent assessments, or forest planning. The Gravina Island project falls within Gravina Inventoried Roadless Area 522 (Figure 3-8). Roadless Areas were re-inventoried in 2003 to support the Final Supplemental Environmental Impact statement (SEIS) to the Forest Plan, which was published in February 2003. The Roadless Area analysis in this Final EIS uses the refined mapping criteria developed for the 2003 inventory to assess potential effects of the project on the Gravina Roadless Area.

## Ecological Subsections

This refers to a mapping delineation devised as part of a national hierarchical framework designed to group ecosystems into logical associations. Gravina Island is mapped as "Clarence Strait Volcanics" in this system. The Gravina Island analysis did not use these polygons as separate analysis areas; however, the publication *Ecological Subsections of Southeast Alaska and Neighboring Areas of Canada* was a useful source of background information.

## Biogeographic Province

This designation refers to 21 ecological subdivisions of Southeast Alaska that are identified by generally distinct ecological, physiogeographic, and biogeographic features. Plant and animal species composition, climate, and geology within each province are generally more similar within than among adjacent provinces. Historical events (such as glaciers and uplifting) are important to the nature of the province and to the barriers that distinguish each province. Gravina Island is part of the Revillagigedo-Cleveland Peninsula Biogeographic Province. Effects of management at this scale are analyzed as part of the Forest Plan.

## Analyzing Effects

Environmental consequences are the effects of implementing an alternative on the physical, biological, social and economic environment. The Council on Environmental Quality (CEQ) regulations implementing the National Environmental Policy Act (NEPA) include the following specific categories to use for the analysis of environmental consequences.

## Direct, Indirect and Cumulative Effects

Direct environmental effects are those occurring at the same time and place as the initial cause or action. Indirect effects are those that occur later in time or are spatially removed from the activity. Cumulative effects result from incremental effects of actions, when added to other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such actions. Cumulative effects can result from individually minor, but collectively significant, actions taking place over a period of time.



## **Reasonably Foreseeable Future Actions**

An analysis of cumulative effects must also include “reasonably foreseeable future actions” (40 CFR 1508.7). This can include National Forest System timber sales as well as land management activities of other landowners on nearby lands. We tend to view reasonably foreseeable future actions as those that are currently planned or scheduled to occur. Our 10-year Timber Sale Plan is the instrument through which future timber sales are scheduled. Therefore, for the purpose of this analysis, reasonably foreseeable future actions are considered to be those that will occur within the next 10 years.

## **Unavoidable Adverse Effects**

Implementation of any alternative, including the No-action Alternative, would cause some adverse environmental effects that cannot be effectively mitigated or avoided. Unavoidable adverse effects often result from managing the land for one resource at the expense of the use or condition of other resources. Many adverse effects can be reduced, mitigated or avoided by limiting the extent or duration of activities. The interdisciplinary procedure used to identify specific harvest units and roads was designed to eliminate or lessen significant adverse consequences. The application of Forest Plan Standards and Guidelines, Best Management Practices, project-specific mitigation measures, and monitoring are all intended to further limit the extent, severity, and duration of potential effects. Such measures are discussed throughout this chapter. Regardless of the use of these measures or the alternative selected, some adverse effects will occur. The purpose of this chapter is to fully disclose these effects.

## **Short-term Use and Long-term Productivity**

Short-term uses, and their effects, are those that occur annually or within the first few years of project implementation. Long-term productivity refers to the capability of the land and resources to continue producing goods and services long after the project has been implemented. Under the Multiple-Use Sustained-Yield Act, and the National Forest Management Act, all renewable resources are to be managed in such a way that they are available for future generations. The harvesting and use of standing timber can be considered a short-term use of a renewable resource. As a renewable resource, trees can be reestablished and grown again if the long-term productivity of the land is maintained. This long-term productivity is maintained through the application of the resource protection measures described in Chapter 2, in particular those pertaining to the soil and water resources, and described in detail in the Draft EIS, Appendix B, Introduction to Unit and Road Cards. These are also discussed throughout this chapter, in particular for silviculture and soils.

## **Irreversible and Irretrievable Commitments**

Irreversible commitments describe a loss of future options. Irreversible applies primarily to the effects of use of nonrenewable resources such as mineral extraction or destruction of a cultural resource site. Once these resources are gone, they cannot be replaced. Irreversible can also apply to factors such as soil productivity that are renewable only over long periods of time.

Irretrievable commitments apply to the loss of production, harvest or use of natural resources. For example, some or all of the timber production from an area is lost irretrievably while an area is serving as a winter sports site. The production lost is irretrievable, but the action is not irreversible because if the use changes, it is possible to resume timber production.

The use of these terms to include in discussions of environmental consequences is found in 40 CFR 1502.16. The definitions above are found in the Forest Service handbook (FSH 1909.15, 05). The disclosure of effects that follows is organized by direct, indirect and cumulative effects. Where necessary, irreversible commitments are identified, but generally timber harvest and associated activities are considered irretrievable commitments of resources.

## **Energy Requirements and Conservation Potential**

An analysis of the energy requirements of implementing the alternatives is discussed in the Silviculture and Timber Management section of this chapter.

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## Available Information

Much of the Tongass National Forest resource data resides in an electronic database formatted for a geographic information system (GIS). The Forest uses GIS software to assist in the analyses of these data. GIS data is available in tabular (numerical) format, and as plots displaying data in map format. For this EIS, all the maps, and most of the numerical analyses, are based on GIS resource data.

There is incomplete knowledge about many of the relationships and conditions of wildlife, fish, forests, jobs and communities. The ecology, inventory and management of a large forest area is a complex and developing science. The biology of wildlife species prompts questions about population dynamics and habitat relationships. The interaction of resource supply, the economy, and communities is the subject matter of an inexact science. However, the basic data and central relationships are sufficiently well established in the respective sciences for the responsible official to make a reasoned choice between the alternatives, and to adequately assess and disclose the possible adverse environmental consequences.

## Other Resources

Several resources and uses of Gravina Island are likely to remain unaffected by the proposed action or alternatives, or will not be affected to a significant degree. Even though significant effects are not anticipated, most of these resources are discussed in the sections of this chapter which follow the introduction, to the extent that measurable effects or differences between alternatives are present. Resources or uses for which no measurable effects were identified are discussed briefly here.

## Air Quality

All of the action alternatives would have limited, short-term effects on ambient air quality. Such effects, in the form of vehicle emissions and dust, are likely to be indistinguishable from other local sources of airborne particulates, including other motor vehicle emissions, dust from road construction and motor vehicle traffic, residential and commercial heating sources, marine traffic, and emissions from burning at sawmills. The action alternatives could result in short-term supplies of raw wood products to local mills. It is the responsibility of the mill owner or sortyard operator to ensure that mill emissions are within legal limits.

## Facilities

There are no logging camps or Forest Service administrative sites on the National Forest System lands on Gravina Island. However, the logging contractor could choose to construct a maintenance facility close to the project area. A permit would be required by the State for this type of activity. Several facilities, including an international airport and a sawmill, exist on the non-National Forest System lands on the island. The State has recently permitted two aquaculture farms in the vicinity of Grant Cove; these permits are not scheduled to expire before 2007.

## Land Status

Under the Alaska Statehood Act of 1959, the State of Alaska is entitled to a certain amount of Federal land. There are no State-selected lands within the Gravina Island project area. The State has established a State marine park in Dall Bay. The legislation that created this park also identifies some adjacent Federal lands that would become part of the park if it is transferred into State ownership. The State has not selected any of these uplands for conveyance under the Alaska Statehood Act. Other legislation granted Alaska Native corporations similar selection rights. There are two areas totalling 1,711 acres around Bostwick Inlet and Dall Bay that are in the selection area of Cape Fox Native Corporation. Encumbered lands potentially affected by proposed activities are identified on the unit cards in Appendix B of the Draft EIS. Revenues generated from these lands are accounted separately and held until the lands are either transferred to new ownership or released from encumbrance.

## Plans of Other Agencies

The CEQ regulations implementing NEPA require a determination of possible conflicts between the Proposed Action and the objectives of Federal, State, and local land use plans, policies, and controls for the area. The major land use regulations of concern are Section 810



of the Alaska National Interest Lands Conservation Act (ANILCA), the Coastal Zone Management Act (CZMA), and the State of Alaska's Forest Practices Act. See the "Findings and Disclosures" section of Chapter 2 in the Draft EIS for discussion of compliance with these laws. State compliance is also discussed at the end of Chapter 1. ANILCA Section 810 requirements pertain to subsistence; these are also discussed in the Subsistence section of this chapter.

Land ownerships on Gravina Island include 22,011 acres that are not National Forest System lands (see Figure 3-1, and Figure 1-1, Chapter 1). These other landowners and agencies have various mandates for management of the land and are currently developing new plans or working with existing plans to achieve these goals. Throughout the planning phase of the Gravina Island Timber Sale project, the IDT has worked with other land managers to coordinate these plans as closely as possible. Plans of other agencies and landowners could involve the following actions within the reasonably foreseeable future, and the cumulative effects discussion for each resource section in this chapter reflects these assumptions.

## **Alaska Department of Natural Resources (DNR)**

DNR manages approximately 7,958 acres of land on Gravina Island. The Southern-Southeast Area Plan includes residential lot sales in Vallenar subdivision during 2000-2005. Some of these lots have already been sold. These residential lot sales are not dependent on or connected to the proposed National Forest System road. DNR also anticipates that under current plans up to 20.5 MMBF (800 acres) of timber harvest could be offered in 2005-2012 from DNR-managed lands. DNR plans to move forward with this harvest regardless of the alternative selected by the Forest Service, including the No-action Alternative.

## **Alaska Mental Health Trust (AMHT)**

The Mental Health Trust holds approximately 3,965 acres of land on Gravina Island in trust for its members. DNR estimates that approximately 825 MBF (39 acres) could be harvested from AMHT lands. In addition, AMHT has subsurface mineral rights to approximately 2,000 acres of State land on the eastern side of Gravina Island.

## **University of Alaska Trust (University)**

The University owns approximately 1,737 acres of land on Gravina Island. DNR estimates that approximately 7 MMBF (280 acres) could be harvested from University lands. In addition, the University has planned residential lot sales in 2000-2005 in the Vallenar subdivision that are not dependent on or connected to the National Forest System road system. Some of these lots have been sold.

## **Alaska Department of Transportation and Public Facilities (DOTPF)**

*Ketchikan International Airport Master Plan:* An Environmental Assessment for this plan was published in February 2002, and the final draft of the Master Plan was published in June 2003. Implementation of the runway relocation began in 2003. Location of the mainline road 8100000 in Alternatives 3, 4, and 6 of the Gravina Island Timber Sale EIS would be outside of the airport reserve boundaries. Alternatives 1, 2, and 5 of the Gravina Island Timber Sale EIS would not construct any road near the airport.

*Gravina Access Project Draft EIS:* The purpose of this plan is to provide surface transportation for vehicles, bicyclists and pedestrians between Revillagigedo (Revilla) and Gravina Islands. The need is to provide Ketchikan residents more reliable, efficient, convenient and economical access to Gravina Island. In the Gravina Access Project Draft EIS (August 2003), several alternatives are considered, which include additional ferry locations and several bridge locations (north of the airport, near the airport and existing ferry, and south of the airport). The preferred alternative (F-1) is to construct bridges between Ketchikan and Gravina Island via Pennock Island. The preferred alternative would build the most new road (2.7 miles) on Gravina Island. Conceptually, this road would tie into the airport access road, and connect with a road being constructed by Ketchikan Gateway Borough to the Pacific Log and Lumber sawmill site (called the Lewis Reef Road in the *Ketchikan International Airport Master Plan*,



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June 2003). These projects would likely lead to additional development and road construction on Borough lands adjacent to the airport.

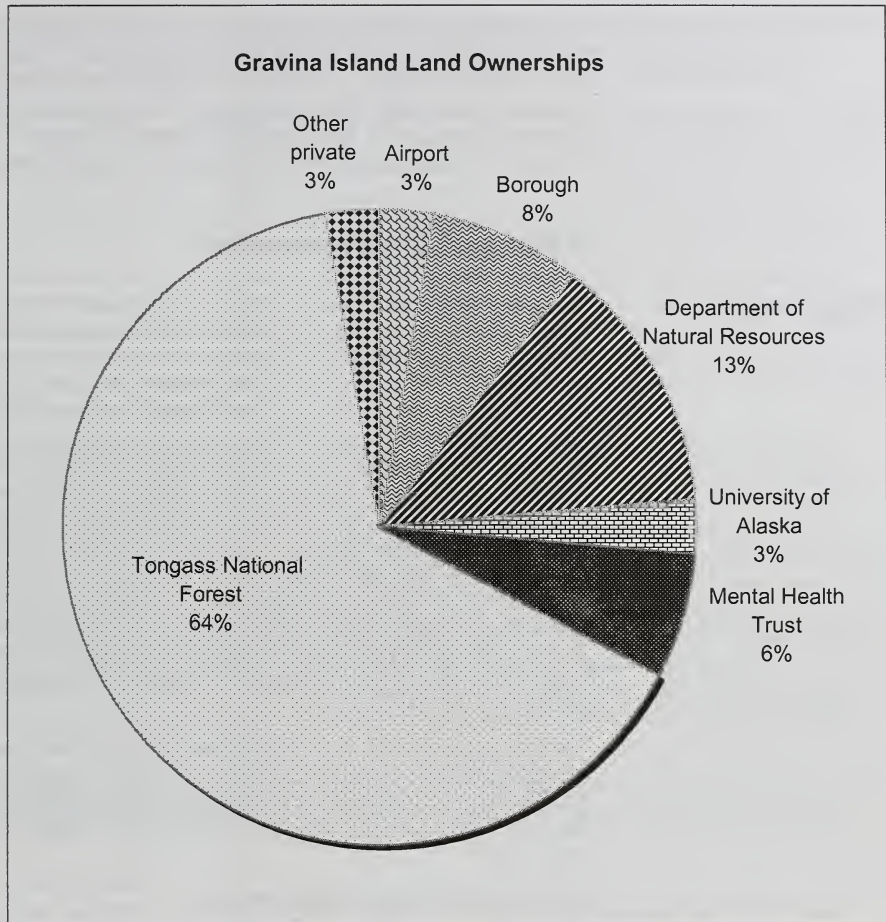
The Gravina Access Project alternatives would not directly link to any roads proposed in the Gravina Island Timber Sale EIS alternatives. However, if the Forest Service decides to implement Alternative 4 (an open road system from Tongass Narrows), this road would be connected with the Gravina Access Project road. There would be increased use of the National Forest System lands associated with this road system, and recreational uses and access for hunting would change from the existing condition. If any other alternative analyzed in the Gravina Island Timber Sale EIS is implemented, there would be no vehicle traffic to National Forest System lands from Borough or State lands. Foot traffic would be allowed.

#### **Ketchikan Gateway Borough (Borough)**

*Borough access road:* The Borough has approximately 4,822 acres of land on the eastern side of Gravina Island adjacent to the Tongass Narrows, excluding the 1,704 acres leased to the Ketchikan International Airport. The Borough has plans to construct 2.5 miles of new road connecting the airport road system to the Pacific Log and Lumber sawmill site on the Tongass Narrows. At this time, the Borough has completed all environmental clearances and secured a Section 404 permit, and is seeking the necessary funds. In Alternatives 3, 4, and 6, the National Forest System road would use 1.65 miles of this new road to access the land-to-barge bulkhead facility at the sawmill, and the Forest Service would obtain an agreement with the Borough for access and maintenance. In Alternatives 1, 2, and 5, the Forest Service would not use this road.

*Ketchikan 2020:* This is a comprehensive plan for the long-range development of Ketchikan that includes the Gravina Island Comprehensive Plan, the Coastal Management Program Update, the Wetlands Development Plan and the Borough Comprehensive Plan Update. The plan's purpose is to guide the Borough toward a desired future based on community values, projected growth and land development needs. The Borough has published drafts of three Area Plans for the eastern coastline of Gravina: north of the airport (North Gravina, November 2003), the airport and lands to the west (Central Gravina and Airport Reserve, December 2003), and south of the airport (Clam Cove and Blank Inlet, November 2003). Area Plans for the remainder of the island are in development. When finalized, these plans will designate specific uses for Borough lands on Gravina Island, such as types of industrial and residential developments and where they would occur. The Gravina Island Timber Sale EIS Alternatives 1, 2, 3, 5, and 6 would not directly influence any of these long-range designations. Alternatives 3, 4, and 6 would maintain an open road system through Borough and State ownerships to National Forest System lands, could influence how these lands are designated and used, especially along the road corridor.

Figure 3-1  
Gravina Island Land Ownerships



Source: HDR, INC. Alaska, 2000

## Silviculture and Timber Management

The following discussions and analysis are based on a variety of sources including existing information and data gathered during field visits in 1998 - 2000. Additional background on forest land classification, silvicultural and logging systems, and other related topics may be found in the Forest Plan Final EIS, Chapter 3: "Timber" and in Appendix G. Applicable direction is contained in the Forest Plan, Chapter 2, Chapter 3 (Timber Production Land Use Designation), Chapter 4 (Forest-wide Standards and Guidelines), and Appendix A.

## Affected Environment

### Forest Vegetation

The natural vegetation of Gravina Island is a mixture of coniferous forest interspersed with alpine tundra, muskeg (bog), shrubland, estuarine, and beach fringe plant communities. The Forest Service has developed a regional plant association guide to help classify different forest types. This helps to provide an inventory of resources and serve as a management guide. The project area contains all seven forested vegetation series which are commonly found throughout southern Southeast Alaska. These vegetation series are grouped together by the dominant overstory species and are as follows: Sitka spruce, western hemlock, mountain hemlock, western hemlock-yellow-cedar, western hemlock-western redcedar, mixed conifer, and shore pine series. These vegetation series are further divided into plant associations, which include the understory vegetation. The Biodiversity and Old Growth section of this chapter discusses aspects of old-growth forest not related to forest products. Various nonforested plant communities also occur in the project area, in estuaries, riparian areas, muskegs, alpine meadows, and alpine lichen rock outcrops. Two tree species that are uncommon in Alaska, Pacific silver fir and Pacific yew, were found in several places throughout the project area. Both of these species are considered at the northern range of their habitat in southern Southeast Alaska.

The species composition in the project area, computed from stand exam data, is: western and mountain hemlock, 57 percent; Alaska yellow-cedar, 7 percent; western redcedar, 19 percent; and Sitka spruce, 16 percent. (These percentages are based on the percent volume (CCF) in the proposed harvest units.) Shore pine, Pacific silver fir, and red alder comprise 1 percent of the total volume.

### Forest Health/ Natural Disturbances

Wind is the major natural disturbing influence shaping the south-aspect slopes of Gravina Island. Most of the south-aspect stands have evidence of periodic windthrow events where openings were created in which successive generations of trees, shrubs, and forbs grew. Initially, windthrow-prone areas are densely stocked and have a relatively sparse understory.

On the wind-exposed south-facing slopes, the most common progression of stand development starts with partial disturbance, with most of the trees blowing down leaving varying numbers of residual trees. Over time, the openings created by the wind event allow seedlings to invade. There are two distinct age classes in the stand: individual, residual trees that were left standing following the wind storm, and the regenerated seedlings that started growing immediately following the storm. Due to the frequency of the storms, the stand often becomes partially disturbed again. If all the older trees blow over, the stand continues to develop with two age classes. If not, the stand structure becomes more complex, now containing three age classes. Many stands never develop more than three age classes, as the oldest age class continually blows over in major storm events.

On the protected north-facing slopes, there is relatively infrequent wind disturbance allowing individual trees to mature and die. Loss of individual trees creates openings in the canopy



providing new growing space for seedlings. Other single trees in the stand will mature, die and create still more openings in the canopy which eventually leads to a multi-storied, uneven-aged stand.

The major difference between the disturbed stands and the undisturbed stands is the number of age classes. In the disturbed stands there will be fewer age classes, clumped or in small acreages. In contrast, the undisturbed stands are characterized by multiple age classes.

Dwarf mistletoe reduces the vigor and growth rate of hemlock and often produces a low quality of timber. Cankorous swellings often occur at the point of infection on limbs and main stems. These cankers offer an entrance for wood-destroying fungi, which can lead to heart rot. The occurrence of dwarf mistletoe varies throughout the project area. Many of the mistletoe infections along the interior main valley of the project area are minor to moderate, affecting one-third to two-thirds of the hemlock. The area northeast of Bostwick Inlet (between Bostwick Inlet and Stomach Bay) contains severe mistletoe infections, affecting nearly 100 percent of the hemlock. Severe mistletoe infections, affecting most of the hemlock, were found in the proposed units in the south end of the project area, particularly in the lower elevations and on the southeastern side. The proposed units in the south end of the project area that are higher in elevation and lie on the southwestern side have either no mistletoe infections or have light, scattered infections.

Alaska yellow-cedar decline is an occurrence causing considerable mortality in Southeast Alaska. Mortality can be in small patches or can cover expansive areas. Affected trees may die quickly within the first 2 or 3 years or more slowly over a 15-year period. The cause of Alaska yellow-cedar decline is not completely understood but the occurrence is generally associated with boggy conditions, usually near muskegs. The Gravina Island project area has some occurrence of cedar decline, especially in the lower-volume, less-productive sites. The disease appears to be affecting scattered, small patches rather than affecting large, expansive areas. No cedar decline was noted, during stand exams, in the areas surveyed in the south end of the island and the area northeast of Bostwick Inlet. Cedar decline was noted in approximately one-third of the surveyed units that lie in the interior main valley of Gravina Island. Only four of the surveyed units had cedar decline rated as severe. These lie on the western side of the interior valley.

Although fire is not a common disturbance agent in Southeast Alaska forests, on June 5, 1905 approximately 200 acres were burned east of Nelson Cove, on the southern part of Gravina Island. The burned area has completely regenerated.

## Past Harvest

Approximately 1,047 acres of timber harvest has occurred on Gravina Island; 419 of those acres are currently in other ownerships. The majority of the harvest took place in the Vallenaar Bay area approximately 50 years ago. In addition to harvest in the Vallenaar area, some harvest occurred on the southwestern shoreline of the island using a combination of A-frame logging and cold-deck swing. This harvest was in close proximity to the beach. No commercial timber harvest on National Forest System land (NFS) has occurred since the 1960s. A mining claim, not on National Forest System land, located in the southern portion of the island was helicopter logged in 1998.

## Forest Land Classification

Stands of trees that are healthy and in a balanced mix of age classes, from very young to harvestable age, are a key part of the desired future condition for managed forest lands. The Forest Plan provides a classification scheme that identifies the amount of forested lands that are capable of, and available for, timber production. To be considered suitable for timber management, forested lands must be capable of producing 20 cubic feet of tree growth (wood fiber) per acre annually, and/or must contain at least 8,000 board feet of net timber volume per acre. These are termed "commercial forest lands" (CFL), sometimes referred to as productive forest lands. There are 20,158 acres of CFL in the Gravina Island project area. (In the Biodiversity and Old Growth, and Wildlife sections of this chapter, old-growth forest is divided

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into productive and nonproductive components. For this project, productive old growth is synonymous with commercial forest land. In this section, the latter terminology will be used.) Appendix A provides the overall rationale for how the Gravina Island Timber Sale fits into the overall timber program for the Tongass.

Commercial forest lands contain suitable forest land that:

- is physically suitable for timber harvest,
- can be adequately restocked in 5 years, and
- has been identified in the Forest Plan as within a land use designation (LUD) that has timber available for timber management. The land use designations within the project area where timber harvest is suitable are: Timber Production and Scenic Viewshed. See additional discussion in Chapter 1.

Examples of forested land considered unsuitable for timber production are lands on slopes greater than 72 percent that have unstable soils, and areas within riparian, beach and estuary buffers.

Of the 20,158 acres of commercial forest land (CFL), 13,356 acres (66 percent) are classified as unsuitable for timber management, either through land use designation (such as Old-growth Habitat), Standards and Guidelines (riparian areas and the beach fringe), or soils or slope criteria. This leaves 6,802 acres currently suitable and available for timber harvest. Suitable forest land for the project is displayed in Table 3-1.

The original Logging System Transportation Analysis for the Gravina Island project area identified approximately 2,542 acres of potential harvest units. However, the GIS database was not refined enough to show small inclusions of unsuitable land within suitable stands. Much of the remaining acres (approximately 4,000) are NIC II lands and were not included as potential harvest units for this analysis. (NIC II refers to timber volume on land that is difficult to access, or is in isolated stands usually accessed by helicopter turns of more than ¾ mile; see Table 3-6). Logging on NIC II lands is currently considered economically marginal. Subsequent field analysis removed over 300 additional acres (including portions of potential units) as being unsuitable or uneconomical for timber harvest. This included areas not capable of producing sufficient volume or not harvestable using existing technology, and unmapped streams requiring riparian buffers. A list of the units not in the current Gravina Island project unit pool and the reasons for not including them is contained in the project planning record.

Table 3-1  
Forest Land Classification Acres

Land Classification	minus	Land Classification	equals	Land Classification
Forested land (37,845 acres)	-	Unproductive land (17,687 acres)	=	Commercial forest land (20,158 acres)
Commercial forest land (20,158 acres)	-	Unsuitable land (13,356 acres)	=	Suitable forest land (6,802 acres)

Source: GIS, Tongass NF

#### Volume Strata

Volume classes were replaced with volume strata during the revision of the Forest Plan. Volume strata were developed which incorporated volume classes with soils. These are:

High Volume Strata - Areas within timber inventory volume classes 5, 6, and 7 on non-hydric soils, and on hydric soils with slopes greater than 55 percent.

Medium Volume Strata - Areas within timber inventory volume classes 5, 6, and 7 on hydric soils with slopes less than or equal to 55 percent; areas within timber inventory volume class 4 that are either on non-hydric soils, or are on hydric soils greater than 55 percent.

Low Volume Strata - Areas within timber inventory volume class 4 that are on hydric soils with slopes less than or equal to 55 percent.

These strata were determined by using the GIS volume class layer and combining it with the soils layer to determine hydric soils.

Table 3-2  
Available Suitable Volume/Acre by Strata

Strata	MBF/Acre	CCF/Acre	Comercial Forest Land Acres	Suitable Acres
Low	19	53	5,501	2,187
Medium	30	68	8,534	2,894
High	41	83	6,123	1,721
<b>Totals</b>			<b>20,158</b>	<b>6,802</b>

Source: Volume/Acre is from 1998 - 2000 Gravina Island stand exam and cruise data.

## Environmental Consequences

### Silvicultural Systems

The term "silvicultural system" refers to a planned process whereby a stand is harvested, re-established and tended. The system name is based on the number of age classes present after the initial harvest, such as even-aged, two-aged and uneven-aged systems.

**Even-aged systems** produce stands that consist of trees of the same or nearly the same age. A stand is considered even-aged if the range in tree ages normally does not exceed 20 percent of the age at which the stand is to be harvested (the "rotation age"). Even-aged management proposed in this project area includes the following prescription types: seed tree cutting, clearcutting with reserves, and clearcutting. These prescriptions remove all, or nearly all, of the overstory trees. Seed tree prescriptions leave a few, select trees, of a particular species, to aid in the re-establishment of that species in the new stand. Clearcutting with reserves is a method that leaves trees, scattered or clumped, throughout the unit to leave structure to meet various resource objectives.

**Two-aged systems** utilize treatments which leave behind a substantial portion (30 to 40 percent of the basal area) of the original stand structure in the form of large trees distributed or clumped throughout the stand area. The remnant trees left on the site represent one "age class" and the newly established trees represent another age class. Two-aged clearcutting with reserves is a method that produces two-aged stands.

**Uneven-aged systems** create stands that include three or more distinctly different age classes. These stands are typically comprised of trees of a variety of ages and sizes, and exhibit multiple canopy layers. These stands tend to be more diverse than even-aged or two-aged stands. Uneven-aged conditions are created through management by using single-tree or group selection methods. Group selection prescriptions call for removal of trees in small openings and/or strips, with the width of the openings generally not to exceed approximately twice the height of mature trees in the stand (approximately 2 acres), scattered across the unit. Single-tree selection cuts prescribe that individual trees, scattered throughout the unit, are selected for removal based on selection criteria. Selection criteria may be based on species, diameters, or spacing. These trees may be individually marked for removal or designated by description in the prescription. Stands proposed for an uneven-aged system in this project would have



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approximately 40 to 50 percent of the basal area removed this entry. The remaining basal area would be removed over two more entries, each of these entries removing approximately 25 percent of the basal area, for a total of three entries.

The acres of harvest by silvicultural system, by alternative, is displayed in Table 3-3.

**Table 3-3**  
**Gravina Island Project Harvest Units, Acres, and Silvicultural Systems by Alternative**

Alt.	Number of Units	Average Unit Size (Acres)	Total Unit Acres	Acres by Silvicultural System		
				Even-Aged <sup>1</sup>	Uneven-Aged <sup>2</sup>	Two-Aged <sup>3</sup>
1	0	0	0	0	0	0
2	56	32	1,801	1,135	404	262
3	60	30	1,818	1,100	434	284
4	79	28	2,218	1,244	522	452
5	36	22	803	219	440	144
6	52	30	1,562	937	341	284

<sup>1</sup>Silvicultural systems include Clearcut, Even-aged Clearcut with Reserves, and Seed Tree.

<sup>2</sup>Silvicultural systems include Group Selection and Single Tree.

<sup>3</sup>Silvicultural system is Two-aged Clearcut with Reserves.

Source: S. Spores, GIS, 2003

Even-aged and two-aged systems more closely mimic the natural conditions of the large-scale disturbance ecologies (for instance, areas subject to windthrow) found throughout Southeast Alaska. Uneven-aged systems more closely mimic the gap-dominated old-growth ecosystems (where large-scale disturbance is not a major factor) found throughout Southeast Alaska.

The selection of the appropriate silvicultural system is dependent upon the feasibility of achieving sound silvicultural objectives. These can include objectives for species composition, stand density, growth rate, windfirmness, insect and disease control, and overstory condition and development. The Forest Plan and public issues are used to refine site-specific objectives. It is important to distinguish scale when visualizing harvest treatments for individual units or stands. For instance, while the ideal condition may be to apply a treatment uniformly over an entire harvest unit, this is often not possible due to terrain, logging systems capabilities, or vegetative conditions.

For a detailed discussion of silvicultural systems and methods, see the Forest Plan Final EIS, Appendix G. Factors influencing and criteria for selection of appropriate harvest methods and silvicultural systems are also presented in the National Forest Management Act implementing regulations (36 CFR 219.27).

Proposed harvest volume is displayed by alternative in Table 3-4. Alternative 1 has no timber harvest. Alternative 4 would offer approximately 47 million board feet which is the most timber volume for sale. Alternative 5 would offer approximately 14 million board feet, which is the least amount of volume.

**Table 3-4**  
Proposed Unit Harvest Volume by Species and Alternative in both CCF and MBF

Volume	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
Sitka Spruce	19,565	19,073	23,461	7,307	15,314
Hemlock	56,290	55,138	66,795	19,979	46,408
Western Redcedar	11,819	11,591	13,957	4,094	9,933
Alaska Yellow-cedar	6,509	6,418	7,600	2,127	5,765
<b>Total CCF<sup>1</sup> (MBF<sup>2</sup>)</b>	<b>94,183 (39,740)</b>	<b>92,220 (38,748)</b>	<b>111,813 (47,178)</b>	<b>33,507 (14,198)</b>	<b>77,420 (31,860)</b>

<sup>1</sup>CF represents a cubic foot. A cubic foot is a solid piece of wood 12 inches wide, 12 inches thick, and 12 inches long. For convenience, timber is often measured in cunits (CCF), or 100 cubic feet. The Forest Service sells timber by CCF.  
<sup>2</sup> BF represents a board foot. A board foot is equal to a 1-inch board 12 inches in width and 1 foot in length. MBF represents one thousand board feet.

Source: NEAT 2002

## Logging Systems

Yarding is the process of conveying logs from the stump to the landing. This can be done using ground-based equipment, cable logging systems, or helicopters. The method used depends upon many factors including access, topography, slope, and resource protection needs.

All yarding proposed is in conformance with national and regional standards and guidelines. Yarding systems were assigned through interdisciplinary analysis to minimize potential effects, and special yarding requirements are specified on the unit cards (see Appendix B of the Draft EIS). On-site ground reconnaissance and field evaluations during the planning and layout process will ensure the yarding system assigned provides the required suspension to meet management objectives.

### Ground-based Yarding

Moist, soft soil conditions in conjunction with steep slopes found in the project area limit the use of ground-based equipment operation. Approximately 7 percent of proposed harvest units lend themselves to shovel logging with track-mounted log loaders. Road rights-of-way are particularly suitable for shovel yarding.

### Cable Yarding

Cable yarding systems are the most common logging systems used throughout Southeast Alaska. Cable systems have the capability to partially or fully suspend logs over the ground, reducing soil disturbance. These systems are best suited to even-aged silvicultural prescriptions. When trees are retained to meet other resource concerns, the economic efficiency declines. Table 3-5 displays the amount of cable system by alternative.

### Helicopter Yarding

Helicopter yarding is proposed in portions of Alternatives 2, 3, 4 and 6 and exclusively in Alternative 5. Helicopter yarding has been successfully used in all areas of the Tongass in recent years. With this system, logs are lifted off the ground (fully suspended) and flown to a specially prepared landing or barge. This yarding system causes the least amount of ground disturbance of all the systems but usually has the highest yarding cost. The economic feasibility of helicopter yarding is more closely affected by timber market values and average yarding distance than is cable yarding. Factors that affect flight time and economic feasibility include flight distance and elevation differences between stump and landing, logs/volume per acre, species mix and subsequent value, and payload capabilities of the aircraft.

Harvest acres by yarding system are shown in Table 3-5. System types have a direct effect on the economics of harvesting timber. Alternative 2 has a high component of short-span cable systems (42 percent). Short-span cable systems are less expensive than long-span cable systems because of shorter turn time between yarding cycles. In addition, Alternative 2 has the least amount of helicopter yarding (46 percent). Helicopter yarding costs can be as much as

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three times higher than cable logging systems. The combination of short-span cable yarding and less helicopter yarding contribute toward Alternative 2 being the most economical on a per-unit harvest basis. This analysis can be applied to the remaining action alternatives. For example, Alternatives 3, 4, and 6 contain about the same percentage of short-span cable and helicopter yarding systems; as a result, these three alternatives are economically similar. Alternative 5 is exclusively helicopter yarding, and as a result, it is the least economical of all the action alternatives. Table 3-13 (in the next section, Social and Economic Environment) displays the costs of the alternatives on a cost-per-CCF basis.

Table 3-5  
Harvest Acres and Volume (in MBF) by Yarding Type

Yarding Type	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
Short-span cable acres	0	755	656	765	0	575
Long-span cable acres	0	94	94	95	0	0
Shovel acres	0	126	126	126	0	74
Helicopter acres	0	826	942	1,232	803	913
Short-span cable volume	0	16,660	13,982	16,272	0	11,728
Long-span cable volume	0	2,074	2,004	2,021	0	
Shovel volume	0	2,780	2,685	2,680	0	1,509
Helicopter volume	0	18,226	20,077	26,205	14,198	18,623

Source: D.Fletcher, 2002

#### ASQ and Non-Interchangeable Components (NICs)

The allowable sale quantity (ASQ) is the amount of timber that can be sold from lands suitable for timber production by decade for a National Forest. This allowable sale quantity is classified into two categories that cannot be interchanged. These are referred to as non-interchangeable components, or NIC.

The purpose of dividing the timber volume is to:

- Maintain economic sustainability by preventing over-harvest of the most economically operable ground, and
- Identify that portion of the timber supply that might not be harvested because of marginally economic conditions.

NIC I (normal operability) refers to timber volume on land that can be accessed by existing logging systems from either existing or proposed transportation systems, including helicopter logging up to ¾ mile away from a road. NIC II refers to timber volume on land that is difficult to access, or is isolated stands usually accessed by helicopter turns of more than ¾ mile. Logging on NIC II lands is currently considered economically marginal. The Forest Plan requires the two NIC volumes to be tracked separately for planning and accounting purposes on a Tongass National Forest level, and anticipates that 80 percent of the ASQ will come from NIC I land and 20 percent from NIC II. The Gravina Island Timber Sale contains both NIC I and NIC II lands. These components can vary by alternative depending on the transportation system. For example, some units proposed for helicopter logging in Alternative 5 are roaded in Alternatives 2, 3, 5 and 6. The proposed roaded access in Alternatives 2, 3, 4 and 6 account for the smaller proportion of NIC II volume compared to Alternative 5.

Table 3-6 displays the NIC II components for each action alternative.



**Table 3-6**  
**NIC II Components by Unit by Alternative**

	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
Unit	0 69, 70, 91, 92, 93, 94	14, 69, 70, 78, 91, 92, 93, 94, 96, 105, 106	42, 45, 69, 70, 91, 92, 93, 94, 96, 105, 106	69, 70, 91, 92, 93, 94	
Percent of Total Volume	0 %	4 %	11 %	40 %	5 %

Source: D. Fletcher, 2002

## Effects on Forest Vegetation

### Forest Structure

The structure of the forest would be affected by timber harvest. The effects would vary by the silvicultural prescription and the number of acres harvested. Goals and objectives for various land use designations and the application of appropriate standards and guidelines found in the Forest Plan would result in the use of a wide range of silvicultural systems including even-aged, uneven-aged, and two-aged management. Use of uneven-aged systems would maintain some old-growth forest but with fewer trees. The distribution of remaining trees would vary depending on the prescription. Removal of trees in patches would result in small openings that would regenerate to second-growth forest. Removal of trees dispersed throughout the stand would result in old trees interspersed with regeneration of young trees. Forest health concerns, including the removal of trees with disease or that face imminent mortality, can be used as factors in determining which trees to harvest. Even-aged and two-aged management would result in the creation of primarily second-growth stands with or without older residual trees. Alternatives 2, 3, 4, 5 and 6 all contain a mixture of these various silvicultural systems. The distribution of trees that are retained would vary between harvest units and alternatives depending on resource objectives, site conditions and logging systems.

The acres of harvest by volume strata, for each alternative, are shown in Table 3-7.

**Table 3-7**  
**Acres of Proposed Harvest by Volume Strata for Each Alternative**

Volume Strata	Commercial Forest Land Acres on Project Area <sup>1</sup>	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
Strata Level		Acres Harvested	Acres Harvested	Acres Harvested	Acres Harvested	Acres Harvested
No Vol Strata <sup>2</sup>		275	287	367	144	280
Low	5,501	341	399	430	176	399
Medium	8,534	711	672	768	159	632
High	6,123	474	460	653	324	251
<b>Total</b>	<b>20,158</b>	<b>1,801</b>	<b>1,818</b>	<b>2,218</b>	<b>803</b>	<b>1,562</b>

<sup>1</sup> From Table 3-2.

<sup>2</sup> No Volume Strata is attributed to GIS mapping error and can be considered as Low Volume Strata. Areas proposed for harvest in the No Volume Strata have been field verified as suitable. Any areas that are found to be correctly classified as No Volume Strata would be removed from the unit during layout.

Source: Forest Service GIS Data

### Forest Health

Alaska yellow-cedar, which is naturally sparsely distributed, is in decline across the Tongass. Stand exam surveys were taken but were concentrated in the overall proposed unit pool. Stand exams are used to obtain general volume figures for comparison across alternatives, potential insect and disease problems, and indications for potential sensitive resource areas. Yellow-

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cedar decline is noted during stand exams as to whether it is present and its relative severity. This qualitative data indicates that, although there is yellow-cedar decline present within the Gravina Island unit pool, much of it is minor in severity and/or located in only one or two areas within a unit. In the entire examined unit pool, only Units 28, 33, 39 and 102 were identified as having yellow-cedar decline in severities rated as severe. In areas of Alaska yellow-cedar decline, it is important that the timber be salvaged before the value is lost. In the units that have yellow-cedar decline, the decline occurs in small patches, rather than across the entire unit, and there are many areas of healthy yellow-cedar. Where yellow-cedar trees are removed in areas of decline, it is likely that a species other than yellow-cedar would regenerate on the site. In the more productive sites within the units, it should be possible to maintain yellow-cedar as a species component. The prescriptions that would be implemented in these units are Seed Tree and Even-aged Clearcut with Reserves. These prescriptions would ensure that some Alaska yellow-cedar trees are left in the overstory to provide a seed source for regeneration of yellow-cedar. In these units, as in all units, the regeneration would be closely monitored following harvest.

#### Proportional Harvest of Cedar

There has been concern that disproportionate amounts of Alaska yellow-cedar and western redcedar are being harvested on the Tongass. The stand exam data collected in the project area during the field seasons of 1998-2000 shows that within the entire Gravina Island unit pool, the percentages of Alaska yellow-cedar and western redcedar, in net cubic foot volume, are 7 percent and 19 percent, respectively. These numbers vary from the estimates calculated from the most recent Forest-wide inventory completed between 1995 and 2000 by the Pacific Northwest Research Station, Forest Inventory and Analysis (FIA) unit. In the Forest Service Region 10 report, *Cedar Harvest on the Tongass National Forest (1997-2001)*, published March 18, 2002, the estimated net cubic volume, calculated from the FIA data, for the Ketchikan area is 9.5 percent Alaska yellow-cedar and 12.5 percent western redcedar. The percent of Alaska yellow-cedar is less (2.5 percent) on Gravina Island, but the percent of western redcedar is higher (6.5 percent), than the estimate calculated from the FIA data.

Table 3-8 displays the the percent of Alaska yellow-cedar and western redcedar proposed for harvest in the Gravina Island project, in net cubic volume by alternative. These numbers show that for most action alternatives, the proposed harvest of these species is very proportional to the existing species percentage.

Table 3-8  
Cedar Harvest Percent (Net Cubic Volume) by Alternative

	Percent of Species Mix (Existing)	Percent of Harvest Under Alternative				
		Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
Alaska yellow-cedar harvest	7	6	7	6	1	8
Redcedar harvest	19	17	18	19	22	19

Source: Stand exam data, 1998-2000, as calculated by Superstand.

Many of the proposed harvest units contain varying amounts and severities of dwarf hemlock mistletoe. Clearcut logging of infected stands is an effective way of removing the disease. Units that have two-aged or uneven-aged management prescribed as a treatment may still have mistletoe- infected trees remaining in the overstory after harvest. The selection criteria in these prescriptions favor removing mistletoe-infected trees first. This should improve forest health in these stands, but probably not to the extent that applying a clearcut prescription would.

#### Post-harvest Species Composition

For all alternatives, where even-aged prescriptions are applied, the overall post-harvest species composition should remain the same as the pre-harvest overstory species composition. Post-

harvest treatments such as planting and precommercial thinning can also be used to achieve desired post-harvest species compositions.

The regeneration capabilities and presence of Pacific silver fir and Pacific yew would be maintained. Where Pacific yew is found in units, it would be documented, and site-specific silvicultural prescriptions would be implemented to maintain its regeneration capabilities and presence.

Where uneven-aged prescriptions are applied, a slightly higher average would be taken of the higher-value species such as Sitka spruce and cedar. This would have minimal effect on overall species composition in the project area, but may decrease the expected value of the next timber harvest entry. (Specifics can be found in the unit prescriptions in the project planning record.)

## **Rotation Age and Future Entries**

Harvested areas treated using an even-aged or two-aged silvicultural systems are expected to regenerate naturally, as have other stands in the general area. The stand initiation stage, immediately following harvest, is expected to last 20 to 30 years. A mixture of shade-tolerant species, such as western hemlock and redcedar, and shade-intolerant spruce would become established. The regenerated second-growth stand would remain in the stem exclusion stage throughout most of the rotation, expected to be approximately 90-110 years, according to each stand's predicted culmination of mean annual increment, determined using stand data in the region's stand growth model, Forest Vegetation Simulator. The objective of these silvicultural methods is to create a fast-growing stand of healthy trees to maximize wood fiber production and to optimize the economic benefit of harvest, consistent with maintenance of other resource objectives.

In all action alternatives, except Alternative 5, approximately 23 percent of the acres would be harvested using an uneven-aged silvicultural system. Alternative 5, with no proposed roads, would have approximately 55 percent of the acres harvested utilizing uneven-aged silvicultural systems. These prescriptions call for the removal of individual trees and small groups of trees (up to 2 acres). Approximately 40-50 percent of the merchantable basal area of the stand would be removed in the units that have single-tree selection and group selection in this first entry. Subsequent entries would be scheduled approximately every 75 years and would remove approximately 25 percent of the basal area. Entries that harvested second growth would begin in approximately 150 years.

Applying uneven-aged silvicultural systems would allow for harvest on visible slopes within the Scenic Viewshed in such a way as to meet long-term visual quality management objectives while providing wood products. There would be some reduction in fiber production as compared to even-aged systems (like clearcuts), which commonly have rotation lengths of about 100 years.

## **Regeneration**

All of the areas proposed for timber harvest are expected to meet the requirements of the National Forest Management Act regulations (Forest Plan, page 4-101, and Appendix A of this Final EIS). Regeneration (stocking) surveys would be conducted on all harvest units, with the exception of single-tree selection, after the third full growing season following the completion of logging. All harvested areas are expected to be naturally stocked and certified after three full growing seasons. Monitoring of previous harvesting on the Ketchikan-Misty Fiords Ranger District shows a 100 percent regeneration success rate. Approximately 37,706 acres have been harvested on this District from 1953 to 2004. As required by NFMA, within 5 years of harvest, all areas have been certified as restocked.

After reforestation, managed forests grow through several distinctive successional stages in which different components dominate the stand and forest structure changes over time. All harvest alternatives will move the project area toward the desired future condition by creating a balanced mix of stand structures and ages.



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## Post-harvest Silvicultural Treatments

Various post-harvest silvicultural treatments will be prescribed on a site-specific basis to help move the project area toward the Forest Plan desired future conditions. Treatments may vary depending on land use classification, slope, soil, aspect, elevation, and resource objectives.

Site-specific unit prescriptions will guide silvicultural treatments for units harvested under this project. Precommercial thinning reduces the competition for sunlight, moisture, and nutrients for what is often referred to as growing space. This additional growing space results in the understory plants and remaining conifers growing at accelerated rates for longer time periods than unthinned, young even-aged stands. Precommercial thinning can also be used to change species composition and windfirmness of the stand.

Precommercial thinning is performed approximately 15-20 years after harvest and is dependent upon site, stocking, and other resource needs. Due to steep terrain, inaccessibility, safety considerations, and available funding, some acres will not be thinned.

## Long-term Timber Productivity (Yield)

All stands proposed for harvest are mature and beyond the age of maximum average annual growth of the stand. Most are representative of uneven-aged western hemlock, cedar and spruce stands that commonly need over 100 years to develop under natural conditions. Harvest increases forest floor temperatures, speeding up organic decomposition and increasing the supply of available nutrients to the trees. The effects of all action alternatives on long-term yield would be the conversion of unmanaged, slow-growing, mature stands to managed, faster-growing, multi-aged or even-aged stands.

The open conditions created by even-aged harvest systems allow Sitka spruce, western redcedar, Alaska yellow-cedar and western hemlock to regenerate rapidly. With the use of precommercial thinning, it is possible to manipulate the species composition of the stands. The composition of the uneven-aged stands proposed in the Gravina Island project area is expected to be similar overall to the original composition.

## Direct and Indirect Effects

### Alternative 1

Vegetation and forest health would not be affected. Tree growth and mortality would continue to progress at the same rate as present. If Gravina is deferred from harvest at this time, forest lands elsewhere with land use designations that allow timber harvest would need to meet the objective of providing the timber for public consumption to meet market demand as directed by Section 101 of TTRA, which states,

“Sec. 705. (a), Subject to appropriations, other applicable law, and the requirements of the National Forest Management Act (P.L. 94-588); except as provided in subsection 9d) of this section, the Secretary shall, to the extent consistent with providing for the multiple use and sustained yield of all renewable forest resources, seek to provide a supply of timber from the Tongass National Forest which (1) meets the annual market demand for timber from such forest and (2) meets the annual market demand from such forest for each planning cycle.”

### Alternative 2

Alternative 2 converts 1,801 acres to a managed condition. Of these acres, 1,135 would be managed as even-aged stands, 262 acres as two-aged stands, and 404 acres as uneven-aged stands.

Of the 666 acres of uneven- and two-aged stands, 255 acres are located within a Scenic Viewshed LUD. The primary purpose in this LUD is to maintain scenic integrity in areas of high visibility. To maintain the visual integrity while managing these acres for timber, the harvest units are planned for helicopter harvest and no roads would be built, which greatly increases the unit layout, sale administration and yarding costs. To balance these costs, the guidelines for selection of removal trees would generally be as follows: first priority for removal would be the trees that are decadent and/or dying, trees that are not expected to live

much longer, and trees that are affected by disease and/or defect. After that, the remaining trees would be selected based on species.

Units within Timber Production LUDs where uneven-aged prescriptions are applied to address visual concerns may have similar selection guidelines, particularly if maintaining scenic integrity is a concern with a unit. Maintaining slope stability is often another concern in which an uneven-aged prescription may be used. These uneven-aged prescriptions would have different selection guidelines and would vary by individual unit.

## **Alternative 3**

This alternative converts the second most acres (1,818) acres to a managed condition. Of these acres, 1,100 would be managed as even-aged stands, 284 acres as two-aged stands, and 434 acres as uneven-aged stands. Of the 718 acres of uneven- and two-aged stands, 340 acres are located within a Scenic Viewshed LUD, and the same removal selection guidelines described for Alternative 2 would also apply to this alternative.

## **Alternative 4**

This alternative converts the most (2,218) acres to a managed condition. Of these acres, 1,244 would be managed as even-aged stands, 452 acres as two-aged stands, and 522 acres as uneven-aged stands. Of the 974 acres of uneven- and two-aged stands, 571 acres are located within a Scenic Viewshed LUD, and the same removal selection guidelines described for Alternative 2 would also apply to this alternative.

## **Alternative 5**

This alternative converts the least amount of acres (803) to a managed condition. Of these 803 acres, 219 would be managed as even-aged stands, 144 acres as two-aged stands, and 440 acres as uneven-aged stands. Of the 584 acres of uneven- and two-aged stands, 420 acres are located within a Scenic Viewshed LUD, and the same removal selection guidelines described for Alternative 2 would also apply to this alternative.

## **Alternative 6**

This alternative converts more acres than Alternative 5 but less than all the other action alternatives. Of the 1,562 acres to be converted, 937 would be managed as even-aged stands, 284 acres as two-aged stands, and 341 acres as uneven-aged stands. Of the 625 acres of uneven- and two-aged stands, 339 acres are located within a Scenic Viewshed LUD, and the same removal selection guidelines described for Alternative 2 would also apply to this alternative.

## **Cumulative Effects**

### **Future Entries**

At this time, no other timber sales are scheduled on National Forest System lands on Gravina Island, as displayed on the 10-year timber sale schedule for the Ketchikan-Misty Fiords Ranger District. Consequently, cumulative effects on stumpage and opportunity for small sales would be driven by the combined effects of this project and those planned on lands of other ownerships.

### **Effects from Other Landowners**

Table 3-9 shows the timber harvest that could occur on non-National Forest System lands within the next 10 years. Although we do not know for certain, timber harvest on non-National Forest System lands has been accomplished using even-aged management systems in the past.

The cumulative effects of past, present and reasonably foreseeable future actions would have little effect on long-term yield and productivity, regeneration or species composition. Past harvest would not affect future stumpage or opportunities for small sales.

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Table 3-9  
Cumulative Foreseeable Timber Harvest on Gravina Island

Alt.	Acres of Past Harvest	Acres of Proposed Harvest on NFS Land	Potential Acres of Harvest on Other Ownerships	Cumulative Acres of Harvest on Gravina Island
1	1,047	0	1,119	2,166
2	1,047	1,801	1,119	3,967
3	1,047	1,818	1,119	3,984
4	1,047	2,218	1,119	4,384
5	1,047	803	1,119	2,969
6	1,047	1,562	1,119	3,728

Source: FS data; M. Curran, Alaska Department of Natural Resources; 2000

#### Energy Requirements and Conservation Potential

The implementation of the proposed alternatives would require the expenditure of energy (consumption of fuel). The amount of energy used varies by alternative, based on the timber volume harvested, the type of harvest system used, the amount of road constructed, and sale preparation and administration.

##### Fuel Consumption

Fuel consumption requirements were estimated as follows:

- Timber Sale Preparation and Administration 1.56 gallons per MBF
- Cable/Shovel Logging 2 gallons per MBF
- Helicopter Logging 8 gallons per MBF
- Load, Haul, Dump, and Tow 8 gallons per MBF
- Road Construction 4,000 gallons per mile
- Road Maintenance 20 gallons per mile

The estimated fuel consumption required for each alternative is displayed in Table 3-10.

Table 3-10  
Estimated Fuel Consumption by Alternative (in Thousands of Gallons)

Activity	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
Cable/Shovel Logging	0	49	43	49	0	31
Helicopter Logging	0	122	136	180	114	130
Load, Haul, Dump, Tow	0	179	174	198	91	125
Road Construction	0	81	89	90.4	0	89
Road Maintenance	0	1.2	1.2	1.5	0	1.2
Sale Prep/ Administration	0	59	60	73	0	50
<b>Total Fuel Consumption</b>	<b>0</b>	<b>491.2</b>	<b>503.2</b>	<b>592</b>	<b>205</b>	<b>426</b>
Average Gallons/ MBF	0	12.4	13.0	12.5	14.4	13.4

Source: D. Fletcher, 2002

##### Conservation Potential

To conserve fuel, and to minimize costs, the Forest Service has undertaken studies nationwide and on the Tongass National Forest to allow experimentation with new or different equipment or techniques. Cable yarding uses about 75 percent as much fuel as shovel yarding and about 25 percent as much fuel as helicopter yarding. However, helicopter yarding can reduce road-



building needs, saving fuel needed for road construction, road maintenance, and trucks hauling logs to the roads.

The use of low-tire-pressure equipment during road construction and logging has also been shown to decrease costs, both in nationwide studies and in studies on the Tongass National Forest. Studies on Mitkof Island indicate that 10 to 14 percent less rock was needed during road construction, resulting in cost savings of approximately \$450,000. It is predicted that costs for rock replacement/road maintenance, log truck fuel, and tire repair and replacement will decrease using this system. Cost savings have proven to be substantial enough that the Forest Service provides a contract clause allowing a reduction in deposits for rock replacement when low-tire-pressure equipment is used.

The use of cable yarding equipment fitted with mechanical or hydraulic interlocks reduces yarding costs, because one does not have to ride the throttle and brake simultaneously to provide deflection of the turn of logs.

## Social and Economic Environment

### Affected Environment

#### Community Economic Base

##### Employment in Southeast Alaska

Approximately 80 percent of Southeast Alaska is within the Tongass National Forest, which extends 500 miles from Ketchikan in the southeast to Yakutat in the northwest. With little private land available, the region is sparsely settled. Approximately 74,000 people live in 33 towns and villages located in and around the Forest. The communities of Southeast Alaska depend on the Tongass National Forest to provide the foundation for natural resource-based industries, which include wood products, commercial fishing and fish processing, recreation, tourism, mining, and mineral development. Many residents also depend heavily on subsistence hunting and fishing to meet their basic needs. There is very little private land in the region to provide these resources. Appropriate management of the Tongass' natural resources is, therefore, extremely important for local communities and the overall regional economy.

##### Employment in the Project Area Vicinity

Three communities adjacent to Gravina Island are directly affected by this project: Metlakatla on Annette Island, and Ketchikan and Saxman on Revillagigedo Island.

The community of Metlakatla, on the Annette Island Indian Reservation, has lost its major sources of non-government employment: the cannery and two sawmills. Metlakatla has recently opened a water-bottling plant and is hoping to introduce small forest product utilization at its mill. The community continues to struggle with high unemployment and economic decline. The community is heavily dependent on subsistence resources, including those that are available on Gravina Island and in the surrounding waters. Metlakatla is very concerned about resource damage and the effect on marine life, especially in Bostwick Inlet. Concerns specific to Metlakatla are discussed further in the next section: Environmental Justice.

Ketchikan, including the greater Ketchikan area, is the 4th largest community in Alaska. Traditionally, timber and fishing have been the economic foundation of the community. The Ketchikan Pulp Company, a major employer for 40 years, closed in 1997. Employment in the fishing and seafood industry has also declined in recent years. Today, the cornerstones of the Ketchikan economy include tourism, government, airport, and shipyard services as well as commercial fishing and timber. Sport fishing and hunting are important recreational activities for area residents. Ketchikan residents have limited roaded recreation and development opportunities on Revillagigedo Island. Gravina Island could provide additional roaded areas on National Forest System lands as well as development opportunities on Borough and State lands.

Saxman is immediately adjacent to Ketchikan and its economy is linked to the larger community. Saxman depends on the tourist industry generated in Ketchikan and on the subsistence resources of Gravina Island.

#### The Timber Industry

##### Forest Products Employment

The forest products industry has been an important part of the economy of Southeast Alaska since the 1950s. Recent forest products employment data are presented in Table 3-11. From 1991 through 2000, the forest products industry provided direct employment for an average of 1,972 workers. Direct employment during this period peaked in 1991 with 3,069 jobs, and has steadily declined since then (Table 3-11).

Employment has dropped recently, primarily due to lower market conditions and the closure of the pulp mill in Ketchikan in 1997. With that closure, employment in the forest products industry has been reduced by approximately 558 jobs. In 2001, total wood products employment in Southeast Alaska was approximately 782 jobs (Forest Plan SEIS, 2003, page 3-246).

**Table 3-11**  
**Forest Products Industry Employment in Southeast Alaska 1991 to 2000**

Employment Type	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Logging	1,554	1,415	1,344	1,177	1,185	1,157	1,049	889	824	711
Saw Mill	604	538	447	515	301	230	184	284	303	280
Pulp Mill	911	910	859	533	516	524	318	96	63	2
<b>Total Direct</b>	<b>3,069</b>	<b>2,863</b>	<b>2,650</b>	<b>2,225</b>	<b>2,002</b>	<b>1,911</b>	<b>1,551</b>	<b>1,269</b>	<b>1,190</b>	<b>993</b>

Source: Forest Plan SEIS, 2003, Table 3.4-18, page 3-289

Further decline of employment in the forest products industry occurred with closure of the Gateway Forest Products veneer mill in Ketchikan. The veneer mill is designed to process the smaller diameter logs. On July 16, 2002, the Ketchikan Gateway Borough (Borough) purchased the facility following the bankruptcy of Gateway Forest Products. The Borough intends to work with the Alaska Industrial Development and Export Authority (AIDEA) to operate the mill or to find a potential buyer. Currently, the Borough is reviewing proposals from prospective operators of the veneer mill. A subsequent increase in employment would occur should the mill become operational in the near future. The level of employment for the mill would depend on the processing capacity and available timber supply.

## Timber Supply and Market Demand

### Recent Changes Affecting Market Demand for Domestic Timber

The timber industry experienced a severe setback in 2001 with the near collapse of the hemlock/white fir shop lumber market. This decline in value was due to an oversupply of hemlock from Canada and radiata pine from several countries, available at lesser cost due to their less-expensive harvest and manufacturing conditions, fewer or no environmental restrictions, and government subsidies or extremely low labor costs.

Until recent years, the timber industry in Southeast Alaska has made few changes in the way they manufacture logs. The strong Asian market in the 1980s – 1990s required only that the logs be manufactured to a flitch or a cant in order to obtain the highest value. Since then, the market for Alaska timber in Japan has gone from very strong to near collapse. Japanese housing starts dropped substantially, especially for the traditional-style homes that utilized much of Alaska's spruce, hemlock and yellow-cedar in the past. At the same time, Western styles and culture became increasingly popular with younger Japanese homebuyers and traditional post-and-beam style home sales were replaced with the more affordable stick frame-constructed homes typical in the U.S.

As a result, mill owners in Southeast Alaska began to find new markets in the U.S. for hemlock and western redcedar. As recently as January 2004, sawmills began to improve their infrastructure to efficiently produce new products in a near-finished form in order to capture more value. These improvements include installing dry kilns and planers to produce high quality finished lumber products. The Ketchikan Wood Technology center in Ketchikan, Alaska is currently testing Sitka spruce, western hemlock, and Alaska yellow-cedar to develop grade stamps for certification. Alaska yellow-cedar and western hemlock were recently approved for certification as an "Alaska yellow-cedar" grade lumber stamp. This designation, along with published lumber grade values, will identify Alaska yellow-cedar as a preferred wood product. Similar lumber grade stamps for "Alaska Sitka spruce" are pending certification and publication is anticipated in May 2004. These grade stamps will differentiate Alaska



# 3 Environment and Effects

## Non-timber Employment

grown and manufactured forest products with superior qualities from other wood products produced in the western United States and Canada.

### Regional Trends

The following discussion is summarized from the *Tongass Land Management Plan Revision Final Supplemental EIS—Roadless Area Evaluation for Wilderness Recommendations (2003)*, Chapter 3, Economic and Social Environment.

Recreation and tourism within Southeast Alaska has increased significantly since 1990, primarily in non-Alaskan resident recreation use. Surveys indicate that these visitors, a majority of which are cruise ship passengers, are generally older, often purchase package tours, use many expensive services, and spend relatively little time in remote settings. Recreation and tourism-based employment is expected to increase by 17 percent in 10 years, with most of this growth due to projected change in non-Tongass, nonresident, recreation-related employment. However, annual cruise ship data for 2000 suggest that these visitors accounted for at least 60 percent of the total visitation to the Tongass National Forest in 2001. Cruise ship companies have heavily marketed Forest-related activities in recent years, and many passengers take at least one trip to the Forest (for example, flightseeing tours to Misty Fjords). Recreational use data for the Tongass National Forest collected between 1984 and 1995 found that semi-primitive motorized recreation demand currently exceeds supply at identified recreation places, but not across the entire Forest. (See the Recreation section in this chapter for an explanation of “recreation places.”) By contrast, roadless areas and wilderness were underutilized and were expected to remain so into the future.

There is not expected to be any significant change to commercial fishing or fish processing industries over the next decade as a result of National Forest System activities. Much of the future of the fishing industry in Southeast Alaska will be dependent upon occurrences outside of the Tongass National Forest such as off-shore harvest levels, changes in ocean currents, competition from farmed fish, and changes in the market for and consumption of fish. In addition, a large segment of the commercial fishing industry operates under a limited entry harvest system, and the number of permit holders is stable from year to year.

### Local Non-timber Activities

The Alaska Department of Fish and Game estimated 823 hunting days on Gravina Island in 2001, with approximately 243 hunters participating that year (ADFG 2001 Deer Hunter Survey Summary Statistics, Gravina WAA 0101), and the Phocena Bay cabin receives an average of 40 paid nights per year for a total of 75 users. Three Outfitter and Guides are currently permitted to operate within the project area for a total of 30 service days per year. (See the Recreation section in this chapter for additional discussion.)

## Environmental Consequences

### Direct and Indirect Effects

#### Project Employment and Income

The action alternatives would have direct and indirect impacts to the economies of Metlakatla, Ketchikan, and Saxman. To estimate the amount of employment and income likely to result from timber harvest alternatives, a simple conversion of board feet to jobs and income is made, using Forest Plan multipliers developed for Southeast Alaska. The Forest Plan SEIS estimated that 5.28 direct jobs are generated per million board feet. This assumes a multiplier value of 0.000975 jobs/CCF (1.95 jobs/MMBF) for direct logging employment for total sale volume. Total sale volume minus Alaska yellow-cedar volume has a multiplier value of 0.001665 jobs/CCF (3.33 jobs/MMBF) for direct sawmill employment. This value was based on the assumption that Alaska yellow-cedar would be exported. Table 3-12 below shows direct logging-related employment and income. These figures represent employment in logging, construction, marine transport, and sawmills. The table assumes job/years is equal to one job

for one year. As would be expected, the higher harvest proposed in Alternative 4 would generate more jobs and income.

**Table 3-12**  
**Logging-related Employment and Income for Each Alternative**

	Alternative					
	1	2	3	4	5	6
Employment <sup>1,3</sup>						
Total Direct Job Years	0	249	243	295	88	204
Income (Millions \$) <sup>2,3</sup>						
Total Direct Income	0	11.1	10.8	13.1	3.9	9.1

<sup>1</sup>Assumes that all timber is sold. Jobs would be created over a span of years depending on when the sale or sales are sold and length of timber sale contract. Number of jobs are not absolute but are used for comparison purposes. Job year/harvest ratios are from the Forest Plan SEIS (2003).

<sup>2</sup>Woods products gross income estimates from the Forest Plan SEIS (2003), adjusted to 2000 dollars.

<sup>3</sup>Assumes export of yellow-cedar.

Source: S. McCoy, NEAT, Second Quarter 2003

All alternatives have been appraised for domestic processing of Sitka spruce, western hemlock, and western redcedar with the assumption that 100 percent of Alaska yellow-cedar and up to 50 percent of the western redcedar volume would be exported for processing to domestic or foreign markets. Currently, about 25 percent of Alaska yellow-cedar, 50 percent of western redcedar, and 75 percent of Sitka spruce and western hemlock is processed in Southeast Alaska (1998-2002 data), with the remainder exported (Wilson 2003). Export prices and local processing costs fluctuate with changes in markets. NEAT analysis is a planning tool, and the estimates of potential sawmill employment (Table 3-12) are best used for a relative comparison between the alternatives.

### Opportunities for Small Sales

The helicopter volume in the southern portion of Gravina Island in Alternatives 2, 3, 4, and 6 could be offered as several smaller sales. The roaded northern portion would most likely be offered as one sale. Alternative 5 would probably be offered as one helicopter sale. Packaging of timber sales depends on market interest and conditions and is an administrative decision that is unrelated to environmental impacts. Alternatives 3, 4, and 6 propose roading infrastructure that would aid in offering future small sales on Gravina Island. Alternative 2 would not likely support a future small sale program due to the decommissioning of the LTF after its' use. The open road system proposed in Alternative 4 would most easily support the development of small sales on Gravina Island.

### Non-timber Employment

Use of inlets and bays for marine-based recreation may be displaced during harvest/log transfer activities due to safety concerns and noise, but these decreases would not be permanent. With the improved access, hunting and recreational use would likely increase in the interior of the island. Current Outfitter and Guide permittees using Bostwick Creek may be displaced in the short term, but the increased access may lead to more permit requests in this area for a larger range of opportunities such as fishing, hunting, hiking, and potential wildlife viewing. (See the Recreation section in this chapter for additional discussion.)

### Payments to the State of Alaska

In previous years, 25 percent of the returns to the U.S. Treasury from revenue-producing Forest Service activities was returned to each State containing National Forest System lands, and then distributed to counties (or, in Alaska, to Organized and Unorganized Boroughs) with National Forest System acreage within their boundaries. These were termed "25 percent fund payments" and were dedicated to schools and roads. More recently, in order to stabilize these payments in the face of declining Forest Service timber harvests and associated revenues,

# 3 Environment and Effects

## Timber Financial Efficiency Analysis

Congress enacted the Secure Rural Schools and Community Self-Determination Act of 2000. Under this Act, boroughs can elect to receive a “full payment amount,” which is the average of the highest three payments made between 1986 and 1999. The act makes this option available through fiscal year 2006.

Under the full payment approach, Forest Service payments to the State of Alaska during the 2001-2006 period are not directly linked to annual revenues, but instead, are based on the historic “high 3-year” average. The Ketchikan Gateway Borough selected the “full payment approach” therefore, the difference in revenues across the planning alternatives will have no effect on the payments these boroughs receive.

One way to compare the effects of the different alternatives is to conduct a financial efficiency analysis. A financial efficiency analysis is a comparison of those costs and benefits that can be quantified in terms of actual dollars spent or received within the project area. When considering quantitative issues, the financial efficiency analysis offers a consistent measure in dollars for comparison of alternatives. This type of analysis does not account for non-market benefits, opportunity costs, individual values, or other values, benefits, and costs that are not easily quantifiable, such as recreation. This is not to imply that such values are not significant or important, but to recognize that non-market values are difficult to represent by appropriate dollar figures. Therefore, financial efficiency should not be viewed as a complete answer but as one tool that decision makers use to gain information about resources, alternatives, and trade-offs between costs and benefits.

Although individual timber harvest units may or may not be economical to harvest by themselves, the management of less-productive land, or land containing a high percentage of defective timber, would help to increase future timber yields. The harvest of units with higher returns would help compensate for those less economical. A preliminary appraisal was conducted for the action alternatives (Table 3-13, Harvest Economic Efficiency Analysis). This analysis was run using the NEPA Economic Analysis Tool (NEAT), which is based on the Transaction Evidence Appraisal method. The analysis compares estimated costs and determines an estimate of expected bid values for recent market conditions. Alternative 1 is not displayed because there is no harvest associated with it.

Harvest volumes were estimated for sawlogs that would be harvested. This volume includes utility logs that may be considered for optional removal at time of sale. These volumes are based on field stand exam data, and the estimates are expected to vary from actual cruise volumes. The expected bid value for the last 12 quarters was used to display each action alternative’s ranking based on the alternative’s estimated timber quantity, quality and logging efficiency. These market scenarios are used to display the cyclical nature of timber markets, and are not intended to display an expected bid value.

Before any National Forest System timber is sold, it is appraised to estimate the material’s fair market value. When a sale is offered, it is offered competitively and the contract is normally awarded to the firm offering the highest bid. These requirements have been imposed to help ensure that the government is justly compensated for any timber it sells. For the Gravina Island Timber Sale, expected bid values were calculated for the action alternatives by including estimated stump to truck, transportation, logging overhead, and road construction costs. The expected bid values do not include bid premiums that could result from competitive bidding for the timber when sold.



Table 3-13  
Financial Efficiency Analysis for the Action Alternatives

	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
Total Volume CCF (MBF)	94,183 (39,740)	92,220 (38,748)	111,813 (47,178)	33,507 (14,198)	77,420 (31,860)
Logging Cost \$/CCF	169.49	182.73	178.21	200.51	178.77
Expected Bid \$/CCF	20.16	5.62	12.57	(5.39) <sup>1</sup>	2.33
Current Market Value \$	1,899,009	518,643	1,405,356	(180,716) <sup>1</sup>	180,421
Direct Jobs	249	243	295	88	204

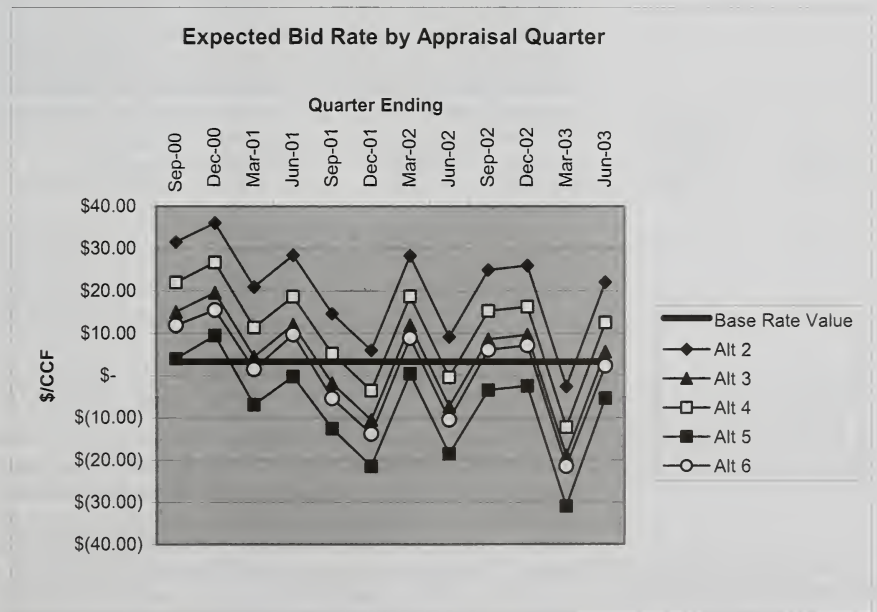
<sup>1</sup> ( ) indicates negative value

Source: S. McCoy, NEAT, Second Quarter 2003

## Financial Efficiency Summary

Figure 3-2 compares the expected bid values for the last 12 quarters, beginning with September of 2000, for the action alternatives. The curve reflects the market conditions over the past 3 years. The bold black line in the middle of the chart depicts base rates, which are the minimal rates the Forest Service would accept for timber. The base rate average for all alternatives is approximately \$3.28. Rates below this line are not expected to sell under current market conditions. Alternatives 2, 3 and 4 display expected bid values above the base rate for 11, 8 and 9 quarters, respectively, of the last 12 quarters, according to the NEAT, Second Quarter 2003 analysis. Alternative 5 is above the base rate for 2 of the last 12 quarters, while Alternative 6 displays values above the base rate for 6 of the last 12 quarters.

Figure 3-2  
Expected Bid Rate by Appraisal Quarter



Source: S. McCoy, NEAT, Second Quarter 2003

# 3 Environment and Effects

## Alternative 2

The financial efficiency analysis for Alternative 2 produced a current market value of \$1,899,009. The expected bid value is \$20.16 per CCF. Alternative 2 has a high positive value due to the low logging costs associated with conventional harvest systems and road construction, coupled with favorable log quality values for sawlogs. Conventional harvest systems account for 54 percent of the total harvest acres while helicopter systems account for 46 percent. Alternative 2 displays an above base rate value for eleven appraisal quarters with a below base rate value displayed in one quarter (Figure 3-2). Alternative 2 would sustain 249 direct jobs.

## Alternative 3

The financial efficiency analysis for Alternative 3 produced a current market value of \$518,643. The expected bid value is \$5.62 per CCF. Alternative 3 has a lower positive value due to higher logging costs associated with helicopter harvest systems, coupled with favorable log quality values for sawlogs. Conventional harvest systems account for 48 percent of the total harvest acres while helicopter systems account for 52 percent. Alternative 3 displays an above base rate value for eight appraisal quarters with a below base rate value displayed in four quarters (Figure 3-2). Alternative 3 would sustain 243 direct jobs.

## Alternative 4

The financial efficiency analysis for Alternative 4 produced a current market value of \$1,405,356. The expected bid value is \$12.57 per CCF. Alternative 4 has a median positive value due to low logging costs associated with high timber harvest volume. Conventional harvest systems account for 44 percent of the total harvest acres while helicopter systems account for 56 percent. Alternative 4 displays an above base rate value for nine appraisal quarters with a below base rate value displayed in three quarters (Figure 3-2). Alternative 4 would sustain 295 direct jobs.

## Alternative 5

The financial efficiency analysis for Alternative 5 produced a current market value of (\$180,716). The expected bid value is (\$5.39) per CCF. Alternative 5 has a deficit value due to the high logging costs associated with helicopter yarding in addition to harvesting the least amount of timber. Helicopter harvest systems account for 100 percent of the total harvest acres, and there is not enough harvest volume to amortize the helicopter logging costs and produce a positive expected bid value. Alternative 5 displays an above base rate value for two appraisal quarters with a below base rate value displayed in ten quarters (Figure 3-2). It would require extraordinary market conditions and timing to capture the market value of this alternative. Alternative 5 would sustain 88 direct jobs.

## Alternative 6

The financial efficiency analysis for Alternative 6 produced a current market value of \$180,421. The expected bid value is \$2.33 per CCF. Alternative 6 has the lowest positive value (and is below base rate) due to the high logging costs associated with helicopter yarding and the low log quality value. Conventional harvest systems account for 42 percent of the total harvest acres while helicopter systems account for the other 58 percent. Alternative 6 displays an above base rate value for six appraisal quarters with a below base rate value displayed in six quarters (Figure 3-2). Alternative 6 would sustain 204 direct jobs.

The estimated harvest volumes, expected bid value, and costs shown are not definitive figures. These estimates are useful for comparing the alternatives but should not be used for determining actual sale volume, costs or values. Merchantable timber within units and any road right-of-way located on National Forest System lands would be cruised to determine the quantity, quality, and value of timber for the contract under which that volume of timber is offered. The final sale appraisal would include current quarter selling values, current cost information, and a normal profit-and-risk allowance to determine the minimum advertised sale value at the time of offering. It should be noted that base rates to cover cost of essential

## Opportunities to Improve Economics

reforestation and a small return to the National Treasury would be the minimum rates advertised for sales appraised deficit. Competitive bidding would determine the actual value.

Currently all the action alternatives have positive expected bid values (Table 3-13) with the exception of Alternative 5. All alternatives have been analyzed using the NEAT program with a 6-inch top diameter and domestic processing of western redcedar. Opportunities to improve the timber sale economics could include: obtaining funding partnerships for road construction, dropping high-cost harvest units, reducing the number of helicopter units, receiving grade stamps Sitka spruce, changing utilization standards, or requesting export authority on species other than Alaska yellow-cedar.

Finding other partners for the road construction phase of the timber sale would improve the timber sale economics while maintaining the level of available harvest volume. It would not result in a change to job projections in the NEAT analysis.

Dropping high-cost harvest units or helicopter units would improve the timber sale economics, but would also reduce the available wood supply, which would ultimately reduce jobs.

Requesting the authority to export species other than Alaska yellow-cedar would improve the timber sale economics, and would not affect timber volume offered. However, a reduction in wood processing jobs may occur due to the export of timber products to other processing centers.

Receiving grade stamp endorsements on spruce would possibly improve economics by increasing demand for these timber products. This could result in additional jobs in wood processing and not reduce the volume of timber to be sold.

Changing the utilization standards from a 6-inch to a 10-inch top would improve timber sale economics. This change would not affect logging jobs but would likely result in fewer wood processing jobs due to a lower amount of timber volume being offered. For example, Table 3-14 displays the difference in utilization specifications for Alternative 5 with a 6-inch and 10-inch top utilization specification.

**Table 3-14**  
**Example of Management Options for Alternative 5**

<b>Economic Factor</b>	<b>Logging Cost \$/CCF</b>	<b>Expected Bid \$</b>	<b>Direct Jobs</b>	<b>Current Market Value \$</b>	<b>Volume CCF</b>
6-inch utilization specification	200.51	(5.39)	88	(180,716)	33,507
10-inch utilization specification.	198.38	13.12	79	394,229	30,059

Source: S. McCoy, NEAT, Second Quarter 2003

As displayed above, there is a reduction in logging cost, direct jobs, and volume. Conversely, there is an increase in the expected bid and current market value as a result of increasing the utilization specification to 10 inches. Options to improve timber sale economics would only be considered if the timber sale were to be found deficit at the time of sale. These options would not be considered for sales that are above cost.

### Effects on Tongass Timber Supply

The Gravina Island Timber Sale would have short-term and long-term effects to supply and demand of wood. There is the opportunity with this project to provide one or more timber sales within a 2-year period. The proposed roads would provide opportunities for future entries.



# 3 Environment and Effects

## Public Investment Analysis

Public Investment Analysis of each alternative compares the value of the timber with the cost of preparing the timber sale. The average Region 10 budget allocation costs and management expenses are subtracted from net stumpage revenues to determine net value. The costs and management expenses include environmental analysis, sale preparation, sale administration and engineering support. Forest Service cost per hundred cubic feet (CCF) is based on the Region 10 average budget allocation of \$20.50/CCF for analysis, \$11.50/CCF for sale preparation, \$4.50/CCF for sale administration and \$14.00/CCF for engineering support. The Public Investment Analysis cost is constant and is applied to all alternatives, including the No-action Alternative.

### Environmental Analysis

Environmental analysis costs include field inventory and the analysis of data, public involvement, and the preparation of a document that satisfies the requirements of the National Environmental Policy Act. The timeframe is about 4 years and involves many resource specialists. Although it is based on timber volume, the cost fluctuates more with the amount of area to be examined and the accessibility of that area. The Gravina Island project area is accessible by boat or helicopter from Revillagigedo Island where the Ketchikan-Misty Fiords Ranger District office is located. This greatly reduces the cost of transportation to the area as compared to other project areas, since this project is adjacent to the Ranger District office. Most other areas are accessible only by long helicopter, floatplane, or boat trips. The environmental analysis cost is constant and applies to all alternatives, including the No-action Alternative.

One of the benefits that cannot be quantified is the knowledge gained for all resources from the inventory and analysis that benefits future forest management.

### Sale Preparation

Unit layout and cruising costs increase significantly when partial harvest is prescribed, compared to clearcutting. The Alternatives to Clearcutting Research Study on Kupreanof Island required about eight times more person-days to prepare a unit that involved marking individual trees throughout the unit compared to a clearcut unit. Designation of 2-acre patches took about four times longer than a clearcut. Accessibility to the units is another major cost factor. Helicopter access and steeper terrain increase sale preparation costs compared to areas with existing road access. The southern helicopter units associated with all action alternatives are composed of group selection, single-tree selection, or two-aged clearcuts with reserves prescriptions. The Gravina Island Timber Sale requires almost exclusive helicopter access for sale preparation.

Using these cost factors, Alternative 2 would be the least costly to prepare because it prescribes the most even-aged prescription, at 63 percent. Alternative 5 would be the most costly, because only 27 percent of the units have even-aged prescriptions. Alternatives 3 and 6 would be almost equal in cost. Alternative 4 would be slightly more costly than Alternatives 3 and 6 because it contains more volume and less even-aged management prescriptions.

### Sale Administration

Sale administration costs are higher when helicopter logging is involved because of the increased cost of accessing the timber harvest area. Scattered and smaller harvest areas are more costly to visit. Because of the higher sale administration costs for helicopter yarding, Alternative 5 would have higher costs than the other action alternatives. Alternative 4 would be the next most costly. Alternative 2 contains the least amount of helicopter units, which would make it the least costly to administer. Alternatives 3 and 6 would be similar in cost to each other.

## Cumulative Effects

Alaska Department of Natural Resources (DNR) has indicated they will move forward with a timber sale on State lands on Gravina Island regardless of activities on NFS lands. DNR is planning to harvest up to 20.5 MMBF of timber volume, from approximately 800 acres of DNR-managed lands on Gravina Island, for the period of 2005-2012. Of this volume,

approximately 60 percent is western hemlock, 20 percent is Sitka spruce, 7 percent is Alaska yellow-cedar, and 13 percent is western redcedar. These percentages are similar to the species composition in Alternative 4. Table 3-15 displays the employment job years and total direct income for logging and sawmills that could be generated by the sale of this timber. DNR estimates that an additional 825 MBF (39 acres) could be harvested from AMHT lands and 7 MMBF (280 acres) could be harvested from University of Alaska lands on Gravina Island; this volume is not included in Table 3-15.

**Table 3-15**  
**Employment and Income Estimates for DNR Timber Harvest on Gravina Island<sup>1</sup>**

	<b>Total Volume Logged (MMBF)</b>	<b>Sawmill Volume Processed (MMBF)</b>
Planned Harvest Volume in MMBF for Years 2005-2012 <sup>2</sup>	20.5	17.8
Employment Job Years - Logging <sup>3</sup>	40	
Employment Job Years - Sawmills <sup>4</sup>		59
Total Direct Job Years <sup>5</sup>		99
Total Direct Income (Millions \$) <sup>6</sup> (with cedar export & local processing)	\$3,063,258	

<sup>1</sup> Estimates of employment and income were applied using Table 3.4-18, page 3-289, Forest Plan SEIS, 2003.

<sup>2</sup> Volume estimate provided by M. Curran, Alaska Department of Natural Resources.

<sup>3</sup> Logging job years is calculated by multiplying total volume logged by 1.95 jobs/MMBF (Forest Plan SEIS, 2003).

<sup>4</sup> Sawmill job years is calculated by multiplying total volume milled by 3.33 jobs/MMBF. Non-Tongass timber

<sup>5</sup> Total direct job years equals logging plus sawmills job years (Forest Plan SEIS, 2003).

<sup>6</sup> Total direct income equals total direct job years multiplied by \$30,942 (average annual income for wood products sector adjusted for inflation in 2002 dollars; Alaska Department of Labor, 2002).

Source: S.McCoy, 2004

Total logging employment was calculated at 40 job years for 20.5 million board feet, assuming that all sawlogs and utility logs to a 6-inch top would be harvested for Sitka spruce, western hemlock, Alaska yellow-cedar, and western redcedar. Total sawmill employment was calculated at 59 job years for 17.8 million board feet. The decrease in volume processed assumes that all Alaska yellow-cedar and 50 percent of the western redcedar volume are exported without any local processing. The allowance for export and the reduction in jobs is similar to the NEAT analyses for Alternatives 2 through 6.

Total direct income from logging and sawmill jobs was valued at \$3,063,258 in 2002 dollars adjusted for inflation. This includes sawlog and utility log processing with export of all Alaska yellow-cedar and 50 percent of western redcedar volume.

Alternatives 2, 3, 5, and 6 would not provide an open road system on National Forest System lands on Gravina Island. Alternatives 3, 4, and 6 would provide an open road to the National Forest property boundary, which would facilitate management and development of private lands. Alternative 1 (no-action) would still likely result in the development and management of private lands, but without the assistance of Forest Service activities. The cumulative effects of past, present and reasonably foreseeable future actions on payments to States and environmental analysis costs would be the same as those associated with the direct and indirect effects of each alternative.

## Environmental Justice

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, was designed to focus Federal attention on the environmental and human health conditions in minority and low-income communities. Specifically, Federal managers are directed to identify and address disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority and low-income populations. This section considers whether there is a disproportionately high and adverse effect from any of the alternatives on low-income and minority communities near the project area, and tiers to the analyses presented in the Subsistence and Social and Economic Environment sections in this chapter.

The Executive Order emphasizes four issues, of which two are relevant to the Gravina Island Timber Sale project. Section 4-4 directs Federal agencies to collect, maintain, and analyze information on the consumption patterns of communities who principally rely on fish and/or wildlife for subsistence. Section 5-5 directs Federal agencies to conduct effective public participation with low-income and minority communities.

CEQ issued guidance on analyzing effects on Environmental Justice under NEPA in December 1997. This guidance clarified that such analyses should recognize the interrelationships between cultural, social, occupational, historical, and economic factors that may amplify the environmental impacts. For example, subsistence in Alaska Native communities is not only important economically, it is also important for reasons of tradition and culture; consequently, impacts on subsistence resource use also impact the social and cultural lives of residents. The CEQ guidance also clarified that the identification of disproportionate effects does not preclude the agency from going forward with the proposed action, but should heighten attention to project alternatives, mitigation and monitoring needs, and the preferences of the affected communities (CEQ 1997, p. 10).

## Affected Environment

Metlakatla and Saxman were identified as low-income or minority communities in the Forest Plan Final EIS (Record of Decision, p. 39), and are the rural communities that may be affected by a Forest Service timber sale on Gravina Island.

### Demographics and Economic Conditions

Metlakatla is a relatively small, isolated community on Annette Island, south of Gravina Island. Annette Island was declared an Indian Reservation by an Act of Congress in 1891 (the only one in Alaska), and Alaska Natives comprise 82 percent of the population of Metlakatla (2000 U. S. Census data). Median household income was \$43,516 in 2000, compared to the regional median of \$44,118. With the 1999 closure of the two sawmills on Annette Island and the closure of the cannery, Metlakatla is experiencing a high rate of unemployed residents. Approximately 21 percent of the labor force was identified as unemployed and seeking work in 2000 (Forest Plan SEIS 2003). Non-federal government and retail trade were the main employers in 1999, accounting for 68 and 10 percent of total employment, respectively. The community has recently opened a water-bottling plant and is planning to introduce small forest product utilization at its mill. Metlakatla residents are heavily dependent on subsistence resources, including those that are available on Gravina Island and in the surrounding waters.

Saxman is located on Revillagigedo Island, 3 miles south of Ketchikan. In 1973, it was certified as a Native village under the Alaska Native Claims Settlement Act. Alaska Natives comprise 66 percent of the population (2000 U. S. Census data). Most employment opportunities for Saxman residents are in the city of Ketchikan. Median household income was \$44,375 in 2000, slightly above the regional median, and approximately 26 percent of the labor



force was identified as unemployed and seeking work (Forest Plan SEIS 2003). Saxman depends on the tourist industry generated in Ketchikan and on the subsistence resources of Gravina, Revillagigedo and Prince of Wales Islands.

## Subsistence Use

### Subsistence Harvest

Subsistence is important to Metlakatla residents for reasons of tradition and culture, and in difficult economic times, subsistence assumes an even larger role in meeting basic nutritional needs. In 1987, all households used some subsistence resources (Table 3-16). Fish and invertebrates accounted for 75 percent of the total edible pounds of subsistence resources harvested by Metlakatla households, and deer accounted for 15 percent (Forest Plan SEIS 2003).

Subsistence is also important to residents of Saxman, with almost 97 percent of households using subsistence resources (1987 data; Table 3-16). Fish and invertebrates accounted for 68 percent of the total edible pounds of subsistence resources harvested by Saxman households, and deer accounted for 19 percent (Forest Plan SEIS 2003).

**Table 3-16**  
Historic Subsistence Use Rates (1987 data), Metlakatla and Saxman

	Households Using (percent)	Estimated Pounds	Per Capita Pounds
<b>Metlakatla</b>			
All subsistence resources	100.0	109,016	70.1
Fish	94.0	58,572	37.7
Large mammals	69.6	16,736	10.8
Marine invertebrates	82.7	22,934	14.8
Vegetation	84.9	7,619	4.9
<b>Saxman</b>			
All subsistence resources	96.7	24,192	93.5
Fish	93.4	13,452	52.0
Large mammals	57.5	5,293	20.5
Marine invertebrates	72.1	3,704	14.3
Vegetation	85.4	1,047	4.1

Source: Community Profile Database, ADFG

### Use Areas

The 1987 ADFG TRUCS survey (Tongass Resource Use Cooperative Survey) identified areas where household members have hunted deer. Metlakatla's traditional household hunting areas include Gravina, Annette, and Duke Islands, the southwestern coastline of Prince of Wales Island, along Carroll Inlet and Thorne Arm on Revillagigedo Island, and along the various coves and estuaries in Misty Fiords National Monument (Forest Plan EIS 1997, Appendix H, p. H-34). Saxman's traditional household hunting areas include Gravina Island, along Carroll Inlet and Thorne Arm on Revillagigedo Island, the southwestern portion of the Cleveland Peninsula, and outlying islands along the northwestern coast of Prince of Wales Island (Forest Plan EIS 1997, Appendix H, p. H-48).

Hunter surveys conducted by ADFG found that greater than 15 percent of the annual Metlakatla deer harvest (1987-1994) came from Gravina, Annette, and Duke Islands (Forest Plan EIS 1997, Appendix H, p. H-35). Greater than 15 percent of the annual Saxman deer harvest (1987-1994) came from western Prince of Wales Island and along the Tongass Narrows and Carroll Inlet on Revillagigedo Island (Forest Plan EIS 1997, Appendix H, p. H-49).

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## Cultural Values

Subsistence traditions provide not only food, but also help to maintain physical, mental and socio-cultural health of Alaska Native Communities. These traditions are linked to ancestral lifestyles, oral traditions, migrations, and villages and other cultural sites. The subsistence lifestyle is the very basis for resource stewardship, which resulted in the traditional form of Clan leadership and social organization and identity. The Clan leader was and still is largely responsible for the physical, social, and spiritual wellbeing of the extended family. This responsibility also included the proper stewardship of the resources that the people depended upon to live. Subsistence activities still remain important for transmitting cultural knowledge from the Elders to the young, which educates the youth about natural resources, their uses, methods of harvesting, processing, and the imperatives for a balance between consumption and the continued regeneration of resources. The value of sharing subsistence foods within the community and at traditional ceremonies provides an opportunity for people to evoke memories of their ancestral legacies and the spiritual values, which not only provide continuity but also a great sense of joy and self esteem within the community (Langdon 2000).

## Public Participation

The public participation strategy for the Gravina Island project included meetings with the federally recognized tribal governments and traditional tribal representatives. These contacts are listed in Chapter 1. These meetings included opportunities to give feedback during alternative development, and Alternative 3 was designed to address subsistence concerns. In 2001, subsistence hearings were held in each of the three communities near the project area (Metlakatla, Saxman, and Ketchikan). A second public meeting was held in Metlakatla to gather additional public comment. During 2002-2003, the Ketchikan-Misty Fiords Ranger District Heritage Program participated in additional consultations with the Native Site Guardianship Council and with tribal governments and traditional clans in Ketchikan, as part of the Forest Service's response to concerns expressed during public comment and tribal government consultations regarding the Gravina Island Draft EIS.

When the Draft EIS was published, the Metlakatla tribal government expressed concerns both for opportunities for small scale harvest opportunities and impacts on subsistence resources. Concerns were also expressed about the visual integrity of southern Gravina Island, since this is visible from Metlakatla. More recently, residents and tribal governments of Metlakatla, Saxman, and Ketchikan have expressed even greater concern with the potential impact of the Gravina Island Timber Sale on subsistence resources, especially marine subsistence in Bostwick Inlet. In early 2002, all three federally recognized tribes prepared resolutions opposing timber harvest on Gravina Island.

## Environmental Consequences

### Effects on Economic Conditions/Access to Jobs

The action alternatives would have a direct economic benefit in the form of jobs associated with timber harvest and manufacture, and road construction. These benefits would likely accrue to the Ketchikan-area community, where those industries are located. Alternatives 3, 4, and 6 would also provide improved access in the form of roads from Ketchikan into the center of Gravina Island.

We estimate that from 88 to 295 direct jobs (logging, construction, marine transport, and sawmills) would be generated by the timber harvest proposed in the action alternatives (Table 3-12, Social and Economic Environment). There would be no quantifiable economic benefits from Alternative 1 (No Action).

There is also service-related income associated with timber harvest that would contribute to the economic stability of the local communities. As of early 2004, sawmills in Ketchikan, Klawock, and Wrangell represent the most likely purchasers of timber provided through this EIS. Economic benefits would be greatest in the community where manufacture took place, but much of the economic activity and services would be based out of Ketchikan in any case.

The economy of Saxman is so closely tied to Ketchikan's that increased employment and spending in the larger Ketchikan community could be expected to have some indirect benefits to Saxman even if Saxman residents were not directly employed in the timber sector. The same is much less true for Metlakatla.

## Effects on Subsistence Use

The distribution and abundance of subsistence resources other than deer are not likely to be significantly impacted by the proposed timber harvest activities. However, the proposed roads would increase access to some subsistence resources (for example, berries and fish), and competition for these resources could increase. This would be particularly true with the open road system proposed in Alternative 4. In Alternatives 3, 4, and 6, the road system would be directly linked to the Tongass Narrows near the airport. This road system would be more readily accessible to residents of Ketchikan and Saxman than Metlakatla, due to the airport ferry and relatively short distances across the Tongass Narrows.

Although timber harvest activities are not expected to significantly impact distribution and abundance of marine resources in Bostwick Inlet, construction of a new log transfer facility (Alternative 2) and log drops (all action alternatives) may impact subsistence uses in the inlet. These resources are particularly important to residents of Metlakatla.

The timber harvest and increased roaded access proposed by the action alternatives are expected to lead to declines in deer abundance and increased hunting pressure on deer on Gravina Island. (This is discussed in detail in the Wildlife and Subsistence sections.) Even with no timber harvest on National Forest System or non-National Forest System lands, hunter demand for deer is expected to increase beyond sustainable levels over the next 30 years. The action alternatives would increase this by about 1 percent (Table 3-56, Wildlife section). It should be noted that the majority of the current demand and projected future demand is from non-rural hunters. If restrictions were to become necessary, they are likely to occur on non-rural hunters first.

Although households in both Metlakatla and Saxman indicated they hunted for deer on Gravina Island, only Metlakatla residents reported they successfully harvested deer from Gravina; Saxman residents harvested deer from Revillagigedo and Prince of Wales Islands (Forest Plan EIS 1997, Appendix H, p. H-49). Combined with new roaded access favoring hunters from Ketchikan and Saxman, a decline in deer abundance and hunter success on Gravina Island may disproportionately impact more rural hunters from Metlakatla than from Saxman, since only Metlakatla reports deer harvest from Gravina Island.

An impact on subsistence harvest would directly impact households dependent on these resources for food. It would also impact the subsistence traditions in these communities, such as the sharing of these resources and the transmission of cultural knowledge and spiritual values related to their stewardship.

## Direct and Indirect Effects

### Alternative 1

The No-action Alternative would not generate any direct income or jobs for any community. Subsistence and access to Gravina Island would remain the same as the current condition.

### Alternative 2

Alternative 2 could affect the marine resources in Bostwick Inlet with construction of a log transfer facility and road, and log drops of timber from helicopter units on the southern end of the island; these resources are particularly important to Metlakatla residents. (See additional discussion in the Marine Environment, Log Transfer Sites and Related Facilities section in this chapter.) Harvest units and road building could change the way upland wildlife species use the island and there could be a decrease in species used for subsistence. A decrease in marine species and upland species could have an effect on all subsistence users, and disproportionately on Metlakatla residents. The LTF would be decommissioned after timber harvest operations have been concluded to reduce the long-term adverse effects of the LTF on the Bostwick marine species. All of the Forest Service roads would be closed to motorized access, with the



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exception of administrative access, to reduce the potential for adverse effects on subsistence resources.

## Alternatives 3 and 6

These alternatives could affect the marine resources in outer Bostwick Inlet with log drops of timber from helicopter units on the southern end of the island. (See additional discussion in the Marine Environment, Log Transfer Sites and Related Facilities section in this chapter.) Harvest units and road building could change the way upland wildlife species use the island and there could be a decrease in species used for subsistence. A decrease in marine species and upland species could have an effect on all subsistence users, and disproportionately on Metlakatla residents. These two alternatives close all of the Forest Service roads to motorized access, with the exception of administrative access, to reduce the potential for adverse effects on subsistence resources.

## Alternative 4

Alternative 4 could significantly change the roaded access and the use of subsistence resources on Gravina Island. An open road system could allow longer seasons of use, increase the area used for hunting, fishing and gathering of resources, and give more people access to these resources. Metlakatla could be disproportionately impacted because they would not have access to the road system as readily as people in Ketchikan and Saxman. Additionally, this alternative could affect the marine resources in outer Bostwick Inlet with log drops of timber from helicopter units on the southern end of the island; these resources are particularly important to Metlakatla residents. (See additional discussion in the Marine Environment, Log Transfer Sites and Related Facilities section in this chapter.) This alternative would reduce adverse effects on subsistence resources through the closure of temporary roads.

## Alternative 5

Alternative 5 could affect the marine resources in outer Bostwick Inlet with log drops of timber from helicopter units on the southern end of the island. (See additional discussion in the Marine Environment, Log Transfer Sites and Related Facilities section in this chapter.) Harvest units could change the way upland wildlife species use the island and there could be a decrease in species used for subsistence. A decrease in marine species and upland species could have an effect on all subsistence users, and disproportionately on Metlakatla residents. The potential for adverse effects on subsistence resources would be reduced through this alternative by not constructing harvest roads and reducing the number of acres scheduled for harvest.

## Cumulative Effects

The cumulative effects of each alternative on timber economics, combined with reasonably foreseeable future actions on other ownerships, are described in detail in the Social and Economic Environment section of this chapter. The harvest volume from a timber sale on State lands would be transported overland to the Tongass Narrows, regardless of the Forest Service alternative selected; this harvest is estimated to provide an additional 99 direct logging-related jobs to the local communities. Service-related income from this harvest would more likely benefit Ketchikan (and Saxman), particularly if the proposed bridge and road system connecting Revillagigedo and Gravina Islands is constructed.

The cumulative effects of each alternative on subsistence, combined with reasonably foreseeable future actions on other ownerships, are described in detail in the Subsistence section of this chapter. Additional harvest on State lands would increase the effects of the action alternatives on deer abundance and hunter demand. The proposed bridge and road system from Revillagigedo Island to Gravina is expected to greatly increase hunter demand of non-rural hunters and competition with rural hunters. Due to the enhanced access for residents of Ketchikan (and Saxman), the cumulative effect on subsistence is likely to be felt disproportionately in Metlakatla.

## Heritage Resources

Heritage resources include all evident of human-related activity, dating from the earliest beginnings to the fairly recent past. In accordance with the National Historic Preservation Act of 1966 (as amended) and the implementing regulations (36 CFR 800), the Tongass National Forest is undertaking a program to identify, evaluate, preserve, and protect heritage resources as a nonrenewable National heritage. The purpose of these investigations is to identify any possible impacts that proposed activities would have on recorded heritage resources in the area that may be eligible for inclusion in the National Register of Historic Places.

### Background

#### Cultural History of Gravina Island

Gravina Island includes spruce-hemlock-cedar forest, muskegs, and alpine areas. A variety of forest products, including bark, roots, berries, wood, and herbs, were used prehistorically and many of these products remain important today.

A few sheltered locations along the shoreline provide protection from the weather. Vallenar Bay to the north and Bostwick Inlet to the south provide limited protection for anchorages of contemporary boats or locations where a canoe could have been drawn ashore in the past. Both of these areas are very shallow and Bostwick has a very rocky perimeter with extensive shoals, which are prone to the effects of high winds and tidal effects. Sheltered locations also occur to some extent in Seal Cove, Dall Bay, Nehenta Bay and Phocena Bay. Other protected areas on the west side of Gravina Island are widely separated and exposed to storms along Clarence Straits.

Mammals, fish, shellfish and aquatic plants have provided important resources for people from prehistoric time until today. Fish traps and other prehistoric sites dating to approximately 3,000 years ago have been identified on Gravina Island that attest to prehistoric use of the area.

Goldschmidt and Hass include Gravina Island in the traditional territories of the Tongass Tribe and state that at Bostwick Inlet there was formerly a big summer village, which was used by the old Tongass people for drying fish and meat and gathering berries. During the 1946 Native rights investigations, informants spoke of smokehouses belonging to the Wolf Clan in Vallenar Bay that were displaced by homesteaders in the 1930s-1940s (Pat Roppel 1996; Goldschmidt and Hass 1946).

Initial mineral exploration in the south Gravina area took place around 1897-1898. Prospecting took place in a chalcopyrite/zinc/gold-bearing region lying near the southern tip of Gravina Island where men located a dozen or more claims a mile inland. The first description of mineral activity in the area was provided by Brooks in 1902.

Early records of commercial fish trap locations along the west shore of Gravina Island are scattered. By 1945, twelve traps operated between South Vallenar Point and Dall Head (13 miles). Most operated until 1958 when they were banned in Alaskan waters. Most fish trap owners off Gravina Island had a cabin onshore for emergency use by the watchman. They stored fishing gear onshore as well. Each trap had a "tailhold" ashore and many rusting cables can still be seen today attached to trees or stumps (Pat Roppel 1996).

Port Gravina and the Port Gravina Sawmill, which was constructed in 1892, were located where the north end of the airport runway is today. This was the first business to be built, managed, and operated entirely by Alaskan Natives. A group of Tsimshians from Metlakatla who had attended the Sitka Industrial Training School started this settlement and sawmill. The sawmill was steam powered and had a daily capacity of 15,000 board feet of sawed and planed lumber. It produced box shooks for salmon boxes used to ship canned salmon. The company sold its lumber in Ketchikan and Saxman. Although the community never had a post office of its own, it had a government school that started in the fall of 1899. Port Gravina thrived for 12 years until July 5, 1904 when a fire started in a small shack behind the sawmill at about 4:00

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a.m. The sawmill, the store, and more than half of the dwellings burned. Some of the Tsimshians moved to Metlakatla, others to Ketchikan, and at least one to Sitka (Pat Roppel 1996).

Antone Stensland homesteaded 320 acres in Clam Cove in 1913. He operated one of the first dairies and chicken farms in the area, selling milk, cheese, buttermilk, sour cream, eggs, and fryers to Ketchikan stores (Pat Roppel 1996).

In November 1914, the Forest Service built a boathouse and shipyard in Clam Cove where crews built many of the Forest Service ranger boats. To provide water for the station, a gravity water system consisting of a dam to impound 200,000 gallons of water and a 4,100-foot pipeline were built by civilian laborers. For a number of years, a one-room grade school was located on the north side of the marine station. The marine station operated until around 1950. The U. S. Coast Guard constructed facilities in Clam Cove in 1921. A boathouse with a hoist was used to store equipment and boats during the winter months. The wharf could be used by larger vessels for storing coal and supplies needed in the field. R. C. Tucker and O. C. Marshall of Ketchikan purchased the buildings and equipment in August 1954 (Pat Roppel 1996).

The results of a literature search and field investigations indicate that the natural resources of Gravina Island have been utilized by various people for approximately 3,000 years. Public meetings and consultations with Saxman IRA, Ketchikan Indian Corporation, the Metlakatla Tribal Council, the Tongass Tribes and with key contacts indicate that many locations on Gravina Island and the natural resources of these areas are still important and are being used by the people of Metlakatla, Ketchikan and Saxman today.

## Affected Environment

### Heritage Resources Inventory

Under the provisions of the Region 10 Inventory Plan/Research Design (1995), all areas below 100 feet above sea level, karst areas, known mining areas, passes and portages, and the shores of certain streams and lakes are considered to be in the High Sensitivity Zone for cultural resources. All areas in the High Sensitivity Zone, which are located in a project's area of potential effect, require ground surveys to locate any significant cultural resource site that might be affected by the proposed activity.

Heritage resource investigations were initiated in 1998 and continued through the summer of 2000. These surveys were concentrated along the shorelines between Blank Point and Vallenar Bay where cultural resource sites were most likely to be present. Additional surveys of road and harvest unit locations within the central valley have provided additional information about heritage resources.

There have been 33 known heritage sites discovered and documented within the Gravina Island project area. Nine are prehistoric, 22 are historic sites and 2 are paleontological sites. The prehistoric sites include fish weirs, fish traps and rock shelters. The historic sites include homesites, fish camps, mining activities, and aircraft navigational beacons. Archeologists have documented 97 trees that have been altered by people in the apparent distant past within the project area.

When Forest Service archaeologists complete field investigations, site locations that are discovered are kept confidential and are not released to the general public. The locations of Native sites and other historic properties, identified by the Forest Service through field inventories, ethnographic research and consultation, are protected through established processes, while many other site locations are not known and therefore cannot be formally protected.



## Consultations

The Forest Service understands that there may be other sites or traditional cultural properties that we have not located or have not yet considered. For all the Native communities which utilize Gravina Island, the primary concern expressed is the protection of traditional cultural sites, areas of historical subsistence use, and the subsistence resources upon which Native people have depended through time. The Gravina Draft EIS solicited public input on the protection of heritage resources and their potential significance, and requested that interested parties share any information on heritage resources that we may not have considered.

During 2002-2003, the Ketchikan-Misty Fiords Ranger District Heritage Program participated in additional consultations with the Native Site Guardianship Council and with tribal governments and traditional clans in Ketchikan, as part of our response to concerns expressed during public comment and tribal government consultations regarding the Gravina Draft EIS. Recognizing that prehistoric and historic archaeological resources are irreplaceable Heritage resources, we are working to establish a program that would provide increased opportunities for concerned and responsible individuals selected by the tribal governments and traditional clans to be an important and integral part of managing heritage resources. We can mutually contribute to the preservation of significant cultural resources, by sharing information about sensitive sites and by participating in site monitoring programs to discourage site vandalism and monitor changes in site conditions from vandalism and/or erosion. It is hoped that this program will promote better understanding and cooperation between tribal governments and the Forest Service, who are mutually concerned about the preservation of traditional cultural sites and resources.

Within the Native community, many locations may be considered to be “sacred” and shared by families or the larger communities, but are not known or recognized by the Forest Service. For some tribes, clans, and individuals, identifying the location of sites for the Forest Service, which may have special sacred or traditional values, is considered inappropriate for many reasons. To some, the entire earth, or an entire mountain, island, valley, or landscape is considered sacred. Some “sacred” localities may not be apparent to the general public but are real to the elders who are concerned about protecting the sacredness of the location. Sacred sites, which have values that are purely intangible and cannot be physically described and therefore are not evaluated by the National Register criteria, cannot be protected by the provisions of the National Historic Preservation Act (NHPA) or the Archaeological Resources Protection Act (ARPA) (National Register Bulletin 38, Guidelines for Evaluating and Documenting Traditional Cultural Properties).

Federal implementing regulations, which include the NHPA and other Federal legislation, have specifically defined terms that Federal agencies must use in the legal sense, while determining whether a site or cultural property is significant and how it is to be protected.

Executive Order 13007 defines a Sacred Site as “any specific, discrete, narrowly delineated location on Federal land that is identified by an Indian tribe, or Indian individual determined to be an appropriately authoritative representative of an Indian religion, as sacred by virtue of its established religious significance to, or ceremonial use by, an Indian religion; provided that the tribe or appropriately authoritative representative of an Indian religion has informed the agency of the existence of such a site.”

A Traditional Cultural Property is defined by the National Register Bulletin 38 as a site that is eligible for inclusion in the National Register because of its association with cultural practices or beliefs of a living community, that are rooted in that community’s history and are important in maintaining the cultural identity of the community.

One fundamental difference between sites that are considered Traditional Cultural Properties or Sacred Sites and other historic sites is that their significance cannot be determined without the consultation and participation of the Native people, the elders, and other knowledgeable people designated by the tribal government.

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Many localities on Gravina Island have been identified during consultations with clan leaders, knowledgeable individuals, and tribal governments as being culturally significant, including localities in Bostwick Inlet. The specific site locations, which have been identified, will be protected through the appropriate provisions of the NHPA and ARPA, National Register Bulletin 38 and Executive Order 13007, and the Native American Graves Protection and Repatriation Act (NAGPRA). Should additional specific site locations be identified, including localities having “Sacred” values, they will be investigated and protected as defined and regulated by the NHPA, ARPA, National Register Bulletin 38 and Executive Order 13007, and NAGPRA.

## Environmental Consequences

### Direct and Indirect Effects

Heritage resources may be impacted from natural forces (such as erosion), public access, or project-related activities. The construction and reconstruction of roads can lead to an increase in discovery and public use of heritage resources. Such increased use can destroy cultural resource sites through inadvertent damage caused by compaction or other ground-disturbing activities, or direct damage from vandalism (relic collecting, defacement, and theft). Protection of National Register Eligible cultural resource sites includes the establishment of public education programs, maintaining confidentiality about specific site locations, monitoring, and directing the public away from the most vulnerable sites.

The proposed Gravina Island timber harvest activities were designed to ensure that no timber harvest, road construction or any other proposed activity is planned within the proximity of any known sites under any of the alternatives and those proposed activities would not affect known heritage resources. Under all alternatives, all heritage sites determined to be National Register Eligible and within the area of potential effect would be monitored by archaeologists throughout the life of the timber sale to ensure that they are protected.

In accordance with the Section 106 process of the National Historic Preservation Act, the field inventory process, the formal report, and the determinations of eligibility and effect have been completed and were submitted to the State Historic Preservation Officer and tribal governments for review in February 2001. Following the Forest Plan Standards and Guidelines and the formalized Section 106 process, we anticipate that no direct or indirect effects to heritage resources would occur from any of the project activities proposed in any of the alternatives. Consultations with the Alaska State Historic Preservation Officer and other interested parties are complete.

### Cumulative Effects

Cumulative effects on heritage resources occur through natural erosion and weathering as well as from continued development near lands containing heritage sites. The bulk of the project area encompasses lands traditionally used and claimed by the Tongass Tribes (Goldschmidt and Haas, 1946). While the proposed project activities would not have an effect on past historic events or sites, continued Federal management activities, coupled with the actions of other land managers on Gravina, may have a long-range, cumulative impact on places of importance to the Tongass Tribe and the Native people of Ketchikan, Saxman and Metlakatla. The following protection measures are designed to preserve National Register Eligible sites.

### Protection Measures

Protection of significant heritage resource sites begins early in the planning process when, in accordance with Section 106 of the National Historic Preservation Act (NHPA), a heritage resource survey is conducted to locate any significant archaeological, historical or traditional use sites, evaluate their significance and the potential effects of a proposed project on the resources located in consultation with the State Historic Preservation Officer prior to project implementation. Culturally sensitive site-specific information either acquired through literature search, or through consultations with tribal governments and individuals is maintained in confidence and protected by statute in the Archeological Resources Protection Act (ARPA) and/or by formal agreements.



Should previously undiscovered archaeological or historical sites be discovered once the Section 106 process has been satisfied and project activities are implemented, project activities will be discontinued at the location of the discovery until a professional archaeologist completes a site evaluation and, if required, mitigation measures which have been agreed upon. During archaeological investigations, the cultural items that are most likely to be encountered either on the surface or in subsurface cultural deposits are the remains of buildings, shelters, or other habitations; historic and prehistoric artifacts that might include the remains of broken or discarded tools and household objects; charcoal, shell, hearths, and fire-cracked rock.

There is also the potential to discover human remains and associated funerary objects, which might include mortuary poles, jewelry, beads, mortuary boxes, and associated clan crest items. If human remains, objects of cultural patrimony or sacred objects, as defined by the Native American Graves Protection and Repatriation Act (NAGPRA) are discovered, the process to be followed in the handling of these remains and cultural items is outlined specifically in 43 CFR 10 Subsection 10.4.

If human remains are discovered during ground-disturbing activities, archaeological survey or testing activities, no further excavation or disturbance will occur in the immediate area. Human remains and any associated funerary objects will not be excavated or removed without consultation with the tribal government representatives. The immediate securing and protection of the discovered remains will be accomplished as appropriate for each circumstance. To the extent possible, notification of tribal government representatives, the coroner, and the State Troopers will occur within 24 hours of the discovery. To insure appropriate respect, protection, treatment and care, a professional archaeologist will be present during any subsequent inspections or activities.

Appointed tribal government representatives will be given the opportunity to be present for examination of the site and will participate in the formulation of a signed mitigation plan, which will detail the further treatment of the remains prior to any further actions. If by consensus, the site and/or human remains are to be covered and remain undisturbed, then the project activity will be moved or redesigned to insure protection. Should removal and/or scientific study be the preferred mitigation, then a report will be compiled that details methods, descriptions, analysis, drawings, photographs, maps and other details or results which would complete the documentation. The final report will be made available to the tribal government(s) for review. Upon completion of any analysis, the Forest Service shall assist in the reburial of the remains and the conservation and curation of cultural items with a museum which has the ability to properly preserve and curate those items as specified in the signed mitigation plan.

Monitoring of sites determined to be eligible for the National Register of Historic Places will occur throughout all aspects of ground-disturbing activities associated with the proposed project. The frequency of monitoring activities will be determined on a case-by-case basis, which will depend upon the significance of each site, and the sensitivity of the site location in respect to potential damage. If a site is determined to be vulnerable to, or determined to be threatened by recreational use, natural erosional processes or project activities, then it will be evaluated for protective measures that might include administrative closure, signing, increased inspection, law enforcement investigation, stabilization, and/or data recovery. Under normal circumstances, National Register eligible sites will be monitored on an opportunity basis or at a minimum annually, unless special considerations warrant other protective measures.

The implementation of these measures throughout the planning for and implementation of the proposed project provide a high level of protection for significant heritage resources.



## Transportation

This section focuses on the effects of each alternative on the road transportation system on Gravina Island, and discusses post-project access management. Log transfer facilities (LTFs) are discussed in the Marine Environment, LTFs and Related Facilities section of this chapter. The effects of the transportation system on other resources are considered in the specific resource sections (Watershed and Fisheries, Recreation, Roadless Area, Scenery, Subsistence, and Wildlife).

## Affected Environment

### Existing Roads

The existing open transportation system on Gravina Island consists of a few short roads (approximately 1.8 miles) adjacent to the Ketchikan International Airport, used for maintenance activities and access. These roads are under the jurisdiction of either State or local governments, or private interests. The system is isolated and is connected with the city of Ketchikan on Revillagigedo Island by a ferry operated by the Ketchikan Gateway Borough. An existing sawmill and land-to-barge bulkhead facility north of the airport, owned by the Pacific Log and Lumber Company, is currently not linked to the airport road system.

There are also approximately 3.0 miles of closed roads near Vallenar Bay. This system was constructed in the early 1950s for a timber sale on National Forest System lands. The roads are presently overgrown with alder and are partially owned privately and by the State of Alaska due to land selections; less than 1 mile is on NFS lands. The proposed roads for this project would not connect with the closed roads near Vallenar Bay.

### National Forest Transportation System Roads

Currently, there are no open roads on National Forest System lands on Gravina Island. Two types of roads may be constructed on NFS lands. Classified roads are determined to be needed for motor vehicle use and are intended to be maintained for the long-term. Temporary roads (usually short spurs) are authorized for short-term use and not intended to be part of the forest transportation system. Temporary roads are usually permanently closed after the completion of harvest activities.

National Forest System roads are categorized based on current or anticipated use into one of three maintenance levels. Maintenance levels incorporate traffic service levels, as indicated in the following definitions. Applicable maintenance levels for the project area are:

- **Maintenance Level 1 (Traffic Service Level D)** - Roads are closed by barrier or bridge removal and are monitored for resource protection. Basic custodial maintenance is performed to perpetuate the road and to facilitate future management activities. As used in this EIS, road "closure" may include the replacement of drainage pipes (culverts) with stormproofing ditches and drainage features, so that ongoing maintenance is not needed. "Decommissioning" refers to permanent closure and is usually applied to temporary roads. This work would be done after the harvest units were recertified as regenerated, usually within 3 years after completion of the timber harvest. Some road segments may be closed immediately after timber harvest is concluded. (See the road cards, Appendix B in the Draft EIS).
- **Maintenance Level 2 (Traffic Service Level C)** - Roads are maintained for high-clearance vehicles and monitored for resource protection. Traffic is normally minor, usually consisting of administrative uses.
- **Maintenance Level 3 (Traffic Service Level B)** - Roads are maintained for travel by a prudent driver in a standard passenger vehicle and are subject to the provisions of the Highway Safety Act. Road use is by administrative and passenger vehicles, and by logging trucks.

## Environmental Consequences

### New Road Construction

The miles and costs of new road construction vary by alternative (see Table 3-17; also Alternative Maps 2 through 6 at the end of Chapter 2). Roads are located to minimize disturbance on the land, yet provide access to resources. Thus, road locations generally follow routes of favorable terrain where practical. Road development patterns are similar from one alternative to another due to the location of the resource being used, terrain characteristics, and development costs. Variations in road segments occur due to differences in routes and locations of log transfer facilities.

Project planning includes an evaluation of existing scenic integrity and the scenic integrity objectives (discussed in the Scenery section in this chapter). Final road, landing and LTF designs would meet these objectives where feasible.

Table 3-17  
Transportation Construction Costs by Action Alternative

	Alternative				
	2	3	4	5	6
Classified road FS (miles)	17.8	14.2	16.7	0	12.6
Classified road State (miles)	1.1	6.7	4.3	0	3.6
Temporary road FS (miles)	1.1	1.2	1.2	0	1.2
<b>Total road (miles)</b>	<b>20.0</b>	<b>22.1</b>	<b>22.2</b>	<b>0</b>	<b>17.4</b>
Total road costs (MM\$) <sup>1</sup>	\$4.0	\$4.4	\$4.4	\$0	\$3.5
LTF costs (\$)	\$180,000	\$0	\$0	\$0	\$0
<b>Total costs (MM\$)<sup>1</sup></b>	<b>\$4.2</b>	<b>\$4.4</b>	<b>\$4.4</b>	<b>\$0</b>	<b>\$3.5</b>

<sup>1</sup> Estimated road construction cost of \$200,000 per mile.

Source: J. Oien, A. Grundy, 2003

In Alternative 2, the proposed road system would transport logs to a new LTF in Bostwick Inlet. Effects of the LTF are discussed in the Marine Environment, LTFs and Related Facilities section in this chapter.

In Alternatives 3, 4 and 6, the National Forest System road would tie into a new road connecting the airport road system to the LTF at the Pacific Log and Lumber sawmill on the Tongass Narrows. The Ketchikan Gateway Borough has plans to construct approximately 2.5 miles of road, and the Forest Service would obtain an agreement with the Borough for access and maintenance. At this time, the Borough has completed all environmental clearances and secured a Section 404 permit, and is seeking the necessary funds. However, should the Borough's road not be constructed at the time the Forest Service advertised a sale, the Forest Service may need to construct a portion of this road (1.65 miles) to the LTF using other funding, depending on the results of the appraisal. This additional cost is not included in Table 3-17.

In Alternatives 2, 3, 4, and 6, portions of the proposed road system would cross State of Alaska lands and require an agreement for access and maintenance; the length varies by alternative (Table 3-17).

No road construction is proposed for Alternative 5, which would be entirely helicopter harvested.

### Access Management

The Road Analysis Process is a science-based analysis with the objective of providing line officers information to develop road systems that are safe and responsive to public needs and

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desires, affordable, efficiently managed, have minimal ecological effects on the land, and are in balance with available funding for needed management activities.

After the completion of harvest activities, road access is managed to prevent damage to the roadway, and to meet objectives for resources such as fish, water quality and wildlife, while maintaining public uses and access for timber management and related activities. The Ketchikan-Misty Fiords Ranger District's access management program includes public and agency involvement and interagency evaluation of road management objectives, and tiers to the *Tongass National Forest Level Road Analysis* (January 2003).

Specific post-harvest traffic strategies for access management on the Gravina timber sale project are described in the Road Management Objectives for specific roads in Appendix B of the Draft EIS.

Following is a description of access management categories.

- Encourage - Motor vehicle use is encouraged by appropriate signing, public notification, and active maintenance of the road prism.
- Eliminate - Motor vehicle use is eliminated by physically blocking the road. Where prescribed for long-term intermittent roads, this strategy is achieved by placement of impassable barricades at road entrances. On short-term roads, removal of drainage structures effectively blocks vehicle traffic.
- Prohibit - Motor vehicle use is prohibited by a road order (CFR closure). Implementation of this strategy on remote road systems may require the installation of gates, in addition to public notification and appropriate signing.
- Prohibit Seasonally - Road is closed to motor vehicle use at times during the normal operating year. For all alternatives, seasonal prohibitions will be used as necessary to mitigate impacts to wildlife and subsistence resources (e.g., closure during either sex deer hunting season). Administrative and permitted use of the roads will continue during closure periods, but only for specific permitted uses. Seasonal closures may be used in combination with cooperative efforts with fish and game protection agencies.

The access management strategy proposed for the Gravina Island project area was developed with the following key points:

- To meet Forest Plan Standards and Guidelines while addressing the economic and social needs of the communities and residents associated with the project, and meeting administrative needs.
- In general, the access management strategy would be to "eliminate" rather than "prohibit" road use (see definitions above). Formal CFR road closures prohibiting use are not often used, however, they may be applied if deemed necessary.

Access management for roads in the project area varies with each alternative and the emphasis of the alternative. Table 3-18 displays the access management strategy by alternative.

Access to road segments on non-National Forest System lands would be managed under agreements with the Alaska Department of Natural Resources (DNR) and Ketchikan Gateway Borough, and future management of these segments is uncertain at this time. Generally, DNR manages their roads as closed after completion of silvicultural activities, in accordance with Best Management Practices (BMPs) and to conserve on maintenance costs. The Borough has indicated a desire to manage road segments on their lands as open. For our analysis, we assumed we would maintain the 8100000 and 8105000 road segments on State and Borough lands consistent with management on NFS lands, by alternative, with the exception that we would not implement an administrative closure on them.



**Table 3-18**  
Access Management for Project Area Roads by Alternative

Road Number	Road Miles	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
81-1 <sup>1,2</sup>	1.88	N/A	Prohibit <sup>3</sup>	Encourage	N/A	Prohibit <sup>3</sup>
81-2 <sup>1,2</sup>	0.53 (Alt 2) 2.17 (Alts	Prohibit <sup>3</sup>	Prohibit <sup>3</sup>	Encourage	N/A	Prohibit <sup>3</sup>
81-3 <sup>1,2</sup>	3.00	Prohibit <sup>3</sup>	Prohibit <sup>3</sup>	Encourage	N/A	Prohibit <sup>3</sup>
81-4 <sup>1</sup>	2.37	Prohibit <sup>3</sup>	Prohibit <sup>3</sup>	Encourage	N/A	Prohibit <sup>3</sup>
81-5 <sup>1</sup>	2.47	Prohibit <sup>3</sup>	Prohibit <sup>3</sup>	Encourage	N/A	Prohibit <sup>3</sup>
81-6 <sup>1</sup>	1.74	Prohibit <sup>3</sup>	N/A	Encourage	N/A	N/A
81-7 <sup>1</sup>	1.77	Prohibit <sup>3</sup>	N/A	N/A	N/A	N/A
8100100	0.72	Eliminate	Eliminate	Eliminate	N/A	Eliminate
8100200	1.07 (Alts 2,4) 0.64 (Alts 3,6)	Eliminate	Eliminate	Eliminate	N/A	Eliminate
8100220	0.19	Eliminate	N/A	Eliminate	N/A	N/A
8100300	1.44	Eliminate	Eliminate	Eliminate	N/A	Eliminate
8100310	0.26	Eliminate	Eliminate	Eliminate	N/A	Eliminate
8100320 <sup>4</sup>	0.35	Eliminate	Eliminate	Eliminate	N/A	Eliminate
8100400	0.37	N/A	Eliminate	Eliminate	N/A	Eliminate
8100500	0.56	Eliminate	Eliminate	Eliminate	N/A	Eliminate
8105-1 <sup>1,2</sup>	1.92 (Alts 2,4) 1.71 (Alt 3)	Eliminate	Eliminate	Encourage	N/A	N/A
8105-2 <sup>1,2</sup>	2.41	N/A	Eliminate	N/A	N/A	N/A
8105100 <sup>5</sup>	0.54	Eliminate	Eliminate	Eliminate	N/A	N/A

<sup>1</sup> Mainline road

<sup>2</sup> Portions (or all) of road segment are on non-NFS land ownership; assumed that access management would be the same as on connecting NFS road segments.

<sup>3</sup> Closure order prohibits motorized vehicles; foot access only allowed

<sup>4</sup> Road segment 8100320 was shortened between Draft EIS and Final EIS to avoid crossing a V-notch

<sup>5</sup> Road segment 8105200 in Draft EIS became 8105100 in Final EIS—other segment was dropped

Source: J. Oien, A. Grundy, 2003

## Road Maintenance Costs

Each alternative in the Gravina project would affect the Road Analysis Process differently, depending on the amount of open road that would require maintenance and monitoring of ecological effects. In order to obtain an affordable road system with all roads maintained to the proper service level, some roads on the district may need to be closed (Maintenance Level 1) and put in a storage status. Putting a road in storage allows us to reduce annual maintenance costs without precluding future use of the road.

Roads are closed for several reasons, including fish and wildlife protection and lack of maintenance funding. Access into new areas that would not be closed would be balanced with

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closure of roads in other areas in order to assure adequate funding for maintenance and resource protection. Table 3-19 displays road closure and maintenance costs by alternative. These costs include the one-time cost of closing the road, and the annual cost for maintaining the road in a closed status. The annual costs differ depending on the type of closure applied.

**Table 3-19**  
**Long-term Operation and Maintenance Costs for Proposed Roads, by Alternative**

	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
<b>Original Closure Cost (One-time Costs) (\$)</b>					
Gate Installation \$3,500/gate	3,500	3,500	0	0	3,500
Administrative Closure <sup>1</sup> \$1,000/mile	11,900 (11.9 mi)	8,800 (8.8mi)	0	0	8,800 (8.8mi)
Road Storage (closed) \$15,000/mile	300,000 (20.0 mi)	331,500 (22.1 mi)	99,000 (6.6 mi)	0	261,000 (17.4 mi)
<b>Total Closure Cost (\$)</b>	<b>315,400</b>	<b>343,800</b>	<b>99,000</b>	<b>0</b>	<b>273,300</b>
<b>Annual Costs (\$)</b>					
Maintenance Level 1 (closed) \$311/mile/year	6,220 (20.0 mi)	6,873 (22.1 mi)	2,053 (6.6 mi)	0	5,411 (17.4 mi)
Maintenance Level 3 (open) \$1,150/mile/year	0	0	17,940 (15.6 mi)	0	0
<b>Total Annual Maintenance Cost (\$)</b>	<b>6,220</b>	<b>6,873</b>	<b>19,993</b>	<b>0</b>	<b>5,411</b>

<sup>1</sup> Corresponds to the "Prohibit" access management category; no admin closure costs on non-NFS ownership.  
Source: J. Oien, 2003

#### Direct and Indirect Effects

##### Alternative 1

Condition of the transportation system would remain as is, with roading nonexistent except for what is now on non-National Forest System lands. There would be no roaded recreation access. Road density would remain the same.

##### Alternative 2

Alternative 2 proposes 20.0 miles of new road construction, which includes 1.1 miles of road across DNR lands that would require an easement. All road segments would be closed and put in storage upon completion of harvest activities. In addition, all motorized vehicle use would be prohibited through a Special Forest Order and installation of a gate near the Forest Service boundary (see Alternative 2 map the end of Chapter 2). One new log transfer facility, in Bostwick Inlet, is proposed under this alternative and would be removed upon completion of harvest activities. No roads would be directly accessible to the public for vehicle use. Public access is anticipated to increase due to boat access from Bostwick Inlet to the road system, which would be available as trails for hiking and recreation.

##### Alternative 3

Alternative 3 proposes 22.1 miles of new road construction, which includes 6.7 miles of road across DNR, Alaska Mental Health Trust, and Borough lands that would require an easement. An additional 1.65 miles of new road, to be built by the Borough, would be used to access the Pacific Log and Lumber land-to-barge bulkhead facility on the Tongass Narrows. All Forest

Service classified road segments would be closed and put in storage upon completion of harvest activities. In addition, all motorized vehicle use would be prohibited through a Special Forest Order and installation of a gate near the National Forest System land boundary (see Alternative 3 map the end of Chapter 2). The roads would be available to the public as trails and would provide hiking access and recreation opportunities.

## **Alternative 4**

Alternative 4 proposes the most new road construction of the action alternatives, 22.2 miles, which includes 4.3 miles of road across DNR, Alaska Mental Health Trust and Borough lands that would require an easement. An additional 1.65 miles of new road, to be built by the Borough, would be used to access the Pacific Log and Lumber land-to-barge bulkhead facility on the Tongass Narrows. At the completion of harvest activities approximately 15.6 miles of road would be left open to the public, providing vehicle access for recreation. The remaining roads would be closed and put in storage. The roads being closed would be available to the public as trails, providing hiking access and recreation opportunities.

## **Alternative 5**

Alternative 5 does not propose any new road construction. Effects on the transportation system would be the same as in Alternative 1.

## **Alternative 6**

Alternative 6 would propose the least amount of road construction of the roaded alternatives, a total of 17.4 miles. This mileage includes 3.6 miles of road across DNR, Alaska Mental Health Trust and Borough lands that would require an easement. An additional 1.65 miles of new road, to be built by the Borough, would be used to access the Pacific Log and Lumber land-to-barge bulkhead facility on the Tongass Narrows. All Forest Service classified roads would be closed and put in storage at the completion of harvest activities. In addition, all motorized vehicle use would be prohibited through a Special Forest Order and installation of a gate near the Forest Service boundary (see Alternative 6 map the end of Chapter 2). The roads being closed would be available to the public as trails, providing hiking access and recreation opportunities.

## **Cumulative Effects**

### **Alternative 1**

Alaska Department of Natural Resources (DNR) has indicated they will move forward with a timber sale on State lands on Gravina Island regardless of activities on NFS lands. A State timber sale will involve overland transport of logs to the existing LTF at the Pacific Log and Lumber Sawmill on the Tongass Narrows. DNR would need to build their own road from the Borough/airport roads to State lands in the interior of the island (approximately 3.2 miles); the most likely route would be close to Bostwick Lake and avoid crossing NFS lands. Up to 17.9 miles of road would be built on State lands to access timber harvest units (Table 3-20).

Alaska Department of Transportation and Public Facilities and Ketchikan Gateway Borough are considering alternatives to increase access between the city of Ketchikan and the airport. In the Gravina Access Project Draft EIS (August 2003), the preferred alternative (F-1) is to construct bridges between Ketchikan and Gravina Island via Pennock Island. The preferred alternative would build the most new road (2.7 miles) on Gravina Island. Conceptually, this road would tie into the airport access road, and connect with the 2.5 miles of planned Borough road from the Pacific Log and Lumber millsite (called the Lewis Reef Road in the *Ketchikan International Airport Master Plan*, June 2003). This project would likely lead to additional development and road construction on Borough lands adjacent to the airport, as envisioned in the Borough's Gravina Area Plans.

These roads on State and Borough ownerships would not result in any additional road construction on National Forest System lands on Gravina Island, and would not have a cumulative effect on the National Forest System road. However, they would enhance public access and likely increase recreation on NFS lands. (See additional discussion in the Recreation section in this chapter.)



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Table 3-20

Cumulative Miles, by Alternative, of Proposed Road Construction on National Forest System Land and Other Ownerships

Proposed Road Construction (miles)	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
Existing open roads (non-NFS lands)	1.8	1.8	1.8	1.8	1.8	1.8
Gravina timber sale proposed roads (NFS and non-NFS lands)	0	20.0	22.1	22.2	0	17.4
Ketchikan Gateway Borough proposed road (non-NFS lands)	2.5	2.5	2.5	2.5	2.5	2.5
State timber sale estimated road miles (non-NFS lands)	17.5	17.9	14.7	14.7	17.9	14.7
Gravina Access Project preferred alternative roads (non-NFS lands)	2.7	2.7	2.7	2.7	2.7	2.7
<b>Total Road Miles</b>	<b>24.5</b>	<b>44.9</b>	<b>43.8</b>	<b>43.9</b>	<b>24.9</b>	<b>39.1</b>

Source: FS Data, Mike Curran, Alaska DNR, and Gravina Access Project Draft EIS, 2003

## Alternative 2

In this alternative, the Forest Service would not build the 8100000 road segment from the NFS boundary to the proposed Borough road. If the Forest Service implemented this alternative, DNR would need to build their own road from the Borough/airport roads to State lands in the interior of the island; the most likely route would be close to Bostwick Lake and avoid crossing NFS lands. DNR may tie their road system into the National Forest System road where it crosses State lands, in the interior of the island. Public vehicle access to the State road system would be controlled by DNR, but even if closed, the State roads would be available as hiking trails. The NFS road system would be closed at the forest boundaries upon completion of timber sale activities and remain available as hiking trails. Access to the NFS road/trail system would be enhanced by the connecting State road system, and the two road systems would cumulatively increase public access on the island. The cumulative effect on access on Gravina Island would be second only to Alternative 4, in which the National Forest System road would remain open for public access. (See additional discussion in the Recreation section in this chapter.)

## Alternatives 3 and 6

In Alternatives 3 and 6, the Forest Service would build the 8100000 road segment from the NFS boundary to the proposed Borough road (approximately 3.2 miles). DNR would use portions of the National Forest System road to access State lands, and the two road systems would be connected during timber sale activities. Upon completion of all timber sale activities, the entire NFS road system would be closed. Consequently, vehicle access to the State road system would also be closed upon completion of all timber sale activities. The two road/trail systems would cumulatively increase public access on the island, although this effect would be less than in Alternatives 2 and 4. (This is discussed in more detail in the Recreation section in this chapter.)

## Alternative 4

Alternative 4 would result in the greatest cumulative increase in public access on Gravina Island. The Forest Service would build the 8100000 road segment from the NFS boundary to the proposed Borough road (approximately 3.2 miles), and maintain the entire 8100000-8105000 mainline road as open upon completion of timber sale activities. DNR would use portions of the National Forest System road to access State lands, and the two road systems would be connected during timber sale activities. Public vehicle access to the State road system would be controlled by DNR, but even if closed, the State roads would be available as

hiking trails. The two road/trail systems would cumulatively increase public access on the island. (See additional discussion in the Recreation section in this chapter.)

## **Alternative 5**

Alternative 5 would result in the least cumulative increase in public access on Gravina Island of the action alternatives. In this alternative, the Forest Service would not build any roads. If the Forest Service implemented this alternative, DNR would need to build their own road from the Borough/airport roads to State lands in the interior of the island; the most likely route would be close to Bostwick Lake and avoid crossing NFS lands. Public access to the State roads would be controlled by DNR. Hiking access to adjacent NFS lands would be enhanced by the nearby State road system, although this effect would be less than in the other action alternatives due to the lack of a NFS road/trail system. (See additional discussion in the Recreation section in this chapter.)

## Marine Environment, Log Transfer Sites and Related Facilities

### Background

Southeast Alaska's coastline consists of approximately 30,000 miles of tidal shoreline, which is roughly 60 percent of the total Alaskan coast. Within this region, a great diversity of habitats comprises Southeast Alaska's complex estuary and tidal environments. Shallow marine waters, mud flats and estuaries provide habitat for shellfish and juvenile salmon. They are part of a complex and dynamic ecosystem that also includes shrimp, flatfish, marine worms, echinoderms, sponges, sea anemones, shellfish, plankton, marine algae, and other organisms.

The intertidal and subtidal marine environments are subject to effects from log transfer and storage facilities; these are the points of concentrated activity associated with marine transportation of logs. Deep bays or coastlines along straits or channels are preferred sites for log transfer facilities (LTFs), log storage areas, camp settlements, and anchorages. These areas are preferred because deeper water is generally less productive and stronger currents disperse bark and debris that may enter the water, and therefore have less impact on marine life. Other marine habitats are not addressed here because the timber harvest activities of this project are not expected to affect them.

### Log Transfer Methods

The transportation of harvested timber from the project area would require the logs to be trucked or flown to the ocean, transferred to barges on the water at an LTF or land-to-barge bulkhead, and towed to a sortyard for sorting. Logs would then be moved to processing sites such as the sawmills at Gravina Island or Wrangell. There is presently one active, permitted land-to-barge bulkhead within the project area, located at the Pacific Log and Lumber Sawmill, northwest of the airport. A new facility in Bostwick Inlet is proposed for Alternative 2.

There are three basic land-based log transfer methods and one marine-based method that can be considered: (1) A-frame entry device with rafting facilities from a bulkhead, (2) low-angle ramp, float-off type facility, (3) land-to-barge type facility (with a bulkhead), and (4) helicopter-to-water (log boom) or barge facility. Of these methods, the land-to-barge and helicopter-to-water or barge are generally considered to have fewer adverse effects on the marine environment overall, and are the methods proposed for this project, and described below. The A-frame and low-angle ramp methods are not proposed for this project.

#### Land-to-Barge Bulkhead

The land-to-barge transfer system requires a deep-water bulkhead for the barge mooring facility. A minimum of 10 feet of water at low tide is required for barge operations. Log trucks are off-loaded in a designated area. The loader then picks up bundles of logs, drives down the bulkhead, and deposits the logs onto the floating log barge. The log barge is fully contained and the logs are not floating directly in the water. This process may require two or three barges to receive and transport logs. The short-term adverse effects of this type of facility are usually from its construction, as very little bark or debris enters the marine environment during the barge loading process.

The rock bulkhead is typically long and slightly wider at the seaward end, for a turnaround area for loading equipment, and requires filling in of the subtidal area. This leaves a "footprint" in the subtidal area and permanently removes the marine habitat. The effects vary with each site due to the topography of the ground and whether the facility is constructed for use at all times and tides, or only for use during high tides.



## Marine-based Methods

Operators are required to obtain a permit from the State of Alaska prior to any transport of logs to water, whether from helicopter to a log boom or helicopter to barge. In the first method, the helicopter sets the logs in the water within a log boom (a large circle of logs cabled together), and a loader moves the logs from the water onto a barge for shipment to a processing plant. This method allows the sorting of logs by species for shipment with minimal investment of barges and equipment. When the helicopter transports logs directly to a barge, a loader immediately sorts the logs by species by moving them to another barge (or two) anchored nearby. This process requires more barge space, although logs do not enter the water. In both instances, any slash developed during the operation is bundled with chokers and flown back to the units on the helicopter's return trip. Use of this method is proposed in Alternatives 2-6.

Barge and log boom drops require locations protected from storms and rough seas where barges can be anchored. More open waters (such as Clarence Strait and Nichols Passage around Gravina Island) are only suitable during good weather, and protected bays are preferred. These bays need to be large enough to allow barges to maneuver, and meet minimum depth requirements. For State permits, the required minimum depth is 40 feet for log boom drops (log rafts), in order to protect subtidal marine life. The same requirement is generally applied to barge drops; however, because barge drops result in much less debris, the State may vary from this minimum site-specifically. Helicopter drops are generally only economical up to 3 miles from harvest units to log drop location, although this will vary by site and with market conditions.

Helicopter transport of logs to a log boom or barge has less effect on the marine environment than do land-based loading methods. Helicopter-to-barge minimizes bark deposition and eliminates embankment in the marine environment. Helicopter-to-log boom deposits more bark; however, the log boom can be located in deep water to avoid bark deposition and embankment in shallow areas, which are higher value to marine organisms.

## Other Associated Facilities

Each land-to-barge LTF requires a log transfer access area, a small airplane and boat dock, and an equipment off-loading ramp, which are part of the LTF permitting process. Log sortyard areas are usually required for barge facilities where sorting by raft is not possible. These facilities are generally located within close proximity of the LTF to reduce costs and limit impacts to a localized area, and are typically 1-3 acres in area.

## Siting Guidelines and Permits

The Alaska Timber Task Force Siting Guideline for LTFs is designed to mitigate the potential effects of bark deposition and toxicity by: (1) locating LTFs in areas with the least productive intertidal and subtidal zones, (2) avoiding sensitive habitats, (3) avoiding shallow water, and (4) locating LTFs along or adjacent to straits, channels, or deep bays where currents are strong enough to disperse sunken or floating wood debris. Currently, all active LTFs receive a yearly underwater diving and sampling transect, as required by the Environmental Protection Agency, to ensure the area of 100 percent bark deposition is less than 1 acre. Prior to use of an LTF for watering logs, an underwater survey is done to establish a baseline for effects of bark on the marine environment.

## Affected Environment

### Log Transfer Sites

Currently there are no LTFs or supporting facilities on National Forest System lands within the project area. An existing land-to-barge bulkhead, with supporting facilities, is located in Tongass Narrows just north of the Ketchikan airport, at the Pacific Log and Lumber Sawmill. Logs are barged to the site and stored. Some log storage occurs in log rafts under a tidelands permit through the Ketchikan Gateway Borough; consequently, no dive surveys are required or performed for its operation. The Forest Service would be obligated to purchase an agreement

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or easement from the private owner for use of the land-to-barge bulkhead and/or access road, in order for any purchaser to bid on the sale on equal footing.

The entire coastline of the Gravina Island project area was analyzed for potential new LTF sites, and six new LTF sites were initially considered for this project: 3 in Bostwick Inlet and 3 in Vallenar Bay (Figure 3-3). Two sites (one each in Bostwick Inlet and Vallenar Bay) were eliminated as being too shallow for a land-to-barge system. The other two sites in Vallenar Bay were eliminated because of their location within a proposed land sale area by the Ketchikan Gateway Borough and their distance from the proposed Gravina project area. Two sites in Bostwick Inlet were considered further, and one is proposed for Alternative 2.

## Bostwick Inlet

Three sites in this area were considered, all located on National Forest System lands (Figure 3-3). The site on the west side of Bostwick Inlet (site Bos 1) was eliminated due to the marine habitat found, the shallow waters, and the proximity of potential cultural sites. The sites on the east side of Bostwick Inlet were analyzed and found suitable for barge operations with construction of a bulkhead. The proposed LTF in Alternative 2 (site Bos 2) was preferred, as it would require less fill than the alternative site (site Bos 3). The baseline engineering and dive survey reports for this site are located in the project planning record.

The U.S. Fish and Wildlife Service completed a dive survey on June 9, 2000. Divers followed a 100-meter transect at the proposed LTF location and documented both physical and biological characteristics of the site. Because the Bostwick Inlet LTF site (Bos 1) is relatively shallow with little current, they concluded that the site would be unsuitable for log rafting, as it is likely the bark would not be sufficiently dispersed, but would be suitable for a land-to-barge facility, where minimal bark deposition occurs. They also reported that the site was not ideal for barges because of the exposure to southerly winds; however, southerly storms would help to oxygenate the water and disperse bark debris.

During their survey, divers found 17 plant species, 25 invertebrate species, and one (non-salmonid) fish (U.S. Fish and Wildlife Service, 2000). They characterized the plant and animal diversity as moderate and the species abundance as average for the area. Bostwick Inlet is a productive fishery for sea cucumbers, sea urchins, Dungeness crab, and geoducks. (Of these species, only sea cucumbers were observed at the LTF site.) Due to its proximity to Ketchikan and Metlakatla, the inlet is very popular for sportfishing and crab fishing, and is an important subsistence use area. The estuary habitat at the head of the inlet is also important to juvenile salmon from Bostwick Creek. There are no commercial seasons for these species in the inlet (according to Alaska Dept. of Fish and Game records); all commercial use is south of Dall Head.

## Tongass Narrows

An existing land-to-barge bulkhead is located in Tongass Narrows, at the Pacific Log and Lumber Sawmill. (See maps for Alternatives 3, 4 and 6 at the end of Chapter 2 for the LTF location.) Alternatives 3, 4 and 6 would connect the project transportation system to Tongass Narrows near the northwest end of the Ketchikan International Airport. The intention is to connect to a road that is planned for construction in the near future by the Ketchikan Gateway Borough, from the Ketchikan International Airport west to the Pacific Log and Lumber Sawmill (and possibly beyond). The Borough road would provide access to the existing land-to-barge bulkhead at the sawmill. In the alternatives using this transportation system, a new LTF would not be constructed.

A baseline dive survey was conducted on April 14, 1997, prior to construction of the sawmill and associated bulkhead facilities. At that time, divers observed 37 species of invertebrates and 6 aquatic plant species, with several species common to abundant. The relatively high diversity appeared to be related to the variety of substrates and gently sloping topography of the site. Their report concluded that intertidal fill (for the sawmill proper) and construction of the land-

to-barge bulkhead would result in the loss of much of this productivity, through direct burial, physical impact, and debris accumulation.

The extent of bark accumulation that has occurred during operation of the mill is unknown, since no dive surveys have been conducted during its operation. Bark dispersal is dependent upon strength of currents as well as topography. The land-to-barge bulkhead site is located on fairly gentle topography; however, the currents through the Tongass Narrows are much stronger than at typical LTF locations (in protected bays) and would readily disperse bark deposited during the transfer of logs. Consequently, bark deposition is likely to be less than that recorded at log rafting LTFs, and is expected to be less than 1 acre of 100 percent deposition, as allowed under State permits for Federal LTF facilities.

## Log Drop Locations

Logs from helicopter yarding units may be flown directly to barges or log booms located in bays around Gravina Island (rather than being transported overland to the LTF). The small bays around Gravina Island are generally very rocky and shallow. Because log drops require deeper water (State permits generally require a minimum depth of 40 feet) and larger protected bays, the most suitable location is the lower end of Bostwick Inlet (Figure 3-3). Other potential locations are discussed below. The exact locations of the barge or log boom drops would be determined by the purchaser, and would require a State (Alaska Dept. of Natural Resources) permit.

### Bostwick Inlet

The marine environment in Bostwick Inlet is discussed above. The intertidal area in Bostwick is large near the estuary, and log drops would be limited by water depths to the outer inlet and mouth. Alternatively, the purchaser may anchor barges along the island coastline along Nichols Passage; there are suitable anchorages near Bostwick Point and Seal Cove. Sites along Nichols Passage are exposed to storms and their use would be highly weather-dependent.

### Small Bays

Phocena Bay and Dall Bay, on the south side of the island, are marginal in size and water depth for barges and may be used for log drops. Grant Cove, on the northwest side of the island, may be used for volume from two units (7 and 14). Alternatively, the purchaser may anchor barges along the island coastline in Clarence Strait and Nichols Passage; these deep-water passages are exposed to storms and their use would be highly weather-dependent.

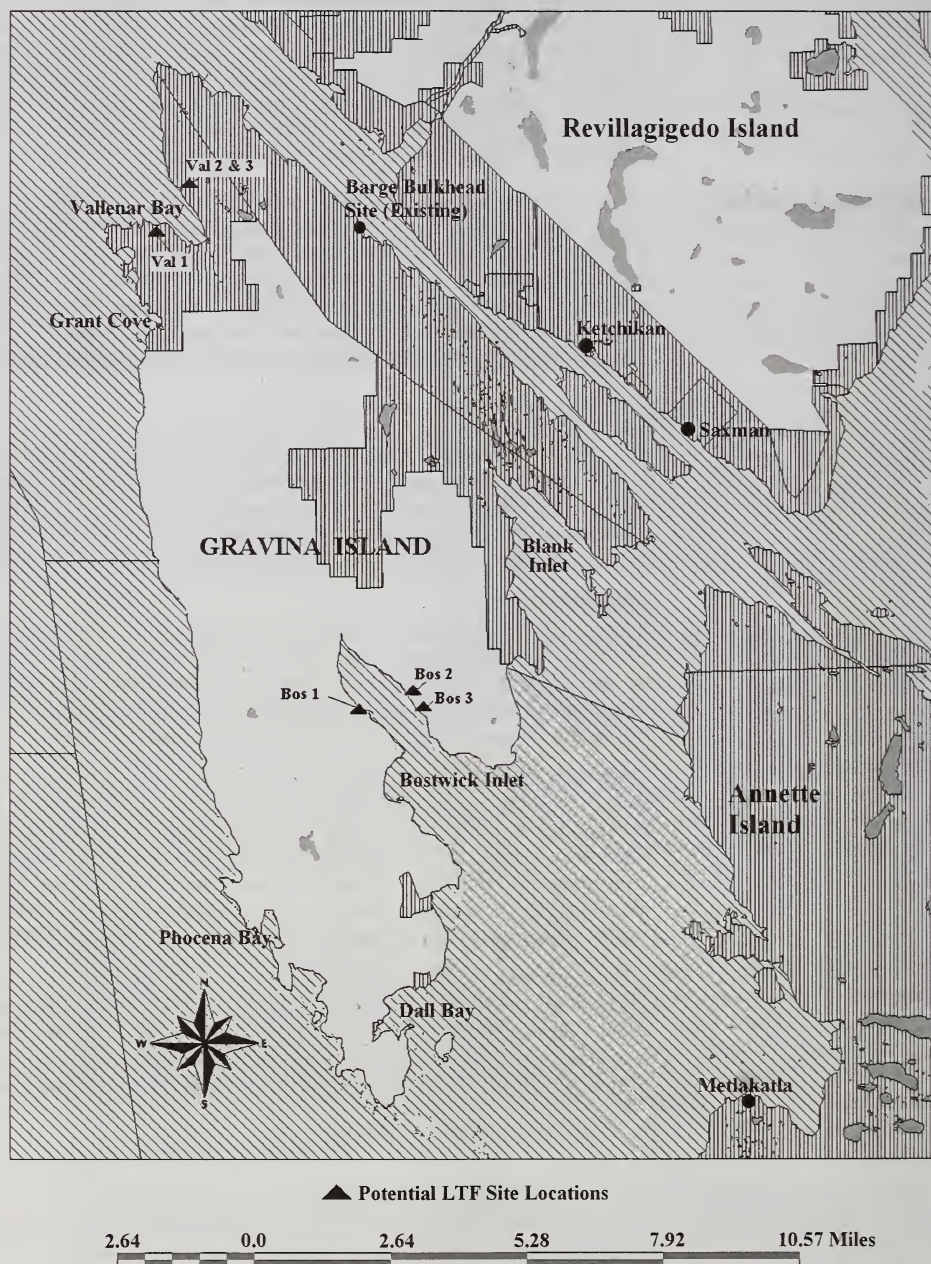
The marine environments in Phocena Bay and Dall Bay are similar to Bostwick Inlet, and clams, sea urchins and geoducks are likely harvested. Crab fishing in these bays is probably not significant, due to the proximity and high productivity of the larger Bostwick Inlet fishery. There are no commercial seasons for these species in the bays around Gravina Island (according to Alaska Dept. of Fish and Game records); all commercial use is south of Dall Head, although commercial fishing boats occasionally anchor in Phocena Bay. Habitat for marine organisms in Grant Cove is limited by the relatively small tidal area.

All of these bays are used for recreational access, with a recreational cabin at Phocena Bay and a proposed State Marine Park at Dall Bay. Grant Cove is popular for sport saltwater fishing. (This is discussed further in the Recreation section of this chapter.) Dall Bay receives subsistence use. Alaska Department of Natural Resources has issued two aquatic farm permits in Grant Cove, for 5 acres each, which are not scheduled to expire before 2007.



# 3 Environment and Effects

Figure 3-3  
Vicinity Map of LTF and Log Drop Sites Considered in Detail



Source: GIS, P. Klein, 2002

## Environmental Consequences

A new log transfer facility is proposed only for Alternative 2, while log drops are proposed for all action alternatives. A sortyard would also be needed near the Bostwick LTF. The LTF would be decommissioned upon completion of the timber harvest activities.

During the transfer of logs from land to water, bark is sloughed off and may be deposited on the ocean bottom; bark also is continually sloughed off, while the logs are in rafts, by agitation from wind and waves. Bark may impact marine organisms through smothering and alternation of habitat and water quality (Forest Plan, Appendix G-7), and may result in reduced reproduction (O'Clair and Freese 1988). If the bark accumulates on the bottom it can diminish habitat for bottom-dwelling crustaceans and mollusks, as well as hamper underwater vegetation used as food and rearing sites for fish and other organisms. Freese and O'Clair (1987) found that when bark accumulations have average depths of 4 inches or more, neck clams and bay mussels fail to persist. Furthermore, Conlan and Ellis (1979) reported that mollusks and polychaetes (marine worms) were eliminated by bark debris thicker than 1 inch. These effects are more adverse if they occur in shallower water in the subtidal zone, the higher value habitat, and of less concern in deeper water.

Based on a review of scientific literature conducted by Sedell and Duvall (1985), barge use at LTFs generally has less overall effect on the marine environment than does log rafting, because the logs are not stored in the water. Bark and debris would accumulate only in a small area around the extreme seaward end of the facility. Typically, this is an area of less than 600 square feet.

State permits for log drops generally require a minimum water depth of 40 feet; this is considered to be the depth at which light penetration is limiting for intertidal marine organisms, and bark deposition is expected to have minimal impacts at this water depth. Consequently, based on their location in deeper water, the marine-based methods (Alternatives 2, 3, 4, 5 and 6) would have fewer adverse effects on marine organisms than the land-to-barge LTF (Alternative 2), which is located in shallower water near shore. Helicopter-to-log boom would input more bark into the water than helicopter-to-barge. Barges are anchored for helicopter-to-barge drops, which would be an additional impact to the marine benthic habitat in those locations. However, their locations in deeper water would lessen this effect.

### Bostwick Inlet

Construction of a new land-to-barge LTF in Bostwick Inlet is proposed for Alternative 2. Based on a marine assessment and dive survey, the proposed Bostwick Inlet site would require a rock-filled bulkhead that would extend 200-250 feet out from shore (similar to a jetty), in order to gain adequate depth. This facility would remove approximately 0.25 acre of marine benthic habitat in Bostwick Inlet. The facility would be designed for use at all times and tides.

Establishment of a land or floating logging camp is unlikely to be necessary for this project, as all areas would be within boating or driving proximity to the city of Ketchikan. However, all action alternatives would require temporary maintenance facilities. These facilities would be evaluated for development to comply with all State and Federal permitting requirements.

The sea current at the proposed LTF at Bostwick Inlet was found to be sufficient for a land-to-barge facility, to flush suspended bark and minimize deposition at the end of the bulkhead, although it is likely that eddies would be created adjacent to the bulkhead near the shore. Its design would comply with the Alaska siting guidelines. The baseline dive report for this site is located in the project planning record. As part of the permitting requirements, survey dives would be conducted yearly while the site is active. Due to its distance from the estuary habitat at the head of Bostwick Inlet (approximately 1 mile) and from any feeder streams, the proposed LTF would not adversely affect juvenile salmon.

### Effects of Site Bark Deposition



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## Tongass Narrows

Current conditions at the Pacific Log and Lumber land-to-barge bulkhead, on the Tongass Narrows, are expected to be less than the State-permitted maximum of 1 acre of 100 percent bark deposition. Due to the strong currents in the Tongass Narrows that would quickly disperse any bark deposited, and the primary use of barges to transfer logs at the site, bark deposition would be expected to remain below levels recorded at log rafting LTFs, and within the State-permitted maximum.

## Small Bays

Logs from the harvest units at the south end of Gravina Island may be flown to three locations: Phocena Bay, Dall Bay, and outer Bostwick Inlet. The average distance to be flown to each of these locations is 1-2 miles to Phocena Bay, 1-2 miles to Dall Bay, and 1-3 miles to Bostwick Inlet. Logs from two units (7 and 14), which only occur in Alternative 4, would be flown 1-2 miles to Grant Cove on the northwest side of the island. Alternatively, the timber may be flown to anchorages in Nichols Passage and Clarence Strait. The estimated volume that may be flown to these locations (or alternate locations) for each alternative is displayed in Table 3-21.

Small amounts of slash and bark debris may drop into the water during log drop operations. However, because State permits require a minimum water depth of 40 feet, this should have a minimal effect on the permitted aquaculture operations in Grant Cove.

Table 3-21  
Total Estimated Volume of Helicopter Log Drops for Locations around Gravina Island, by Action Alternative

Log Drop Location	Total Estimated Volume (MBF) of Log Drops by Action Alternative				
	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
Phocena Bay (Clarence Strait)	1,663	1,375	1,663	1,663	1,375
Dall Bay (Nichols Passage)	2,493	1,646	2,493	2,493	1,646
Bostwick Inlet (Nichols Passage)	1,357	3,620	3,784	4,778	2,166
Grant Cove (Clarence Strait)	0	0	2,207	0	0

Source: S. McCoy, 2003

## Direct and Indirect Effects

### Alternative 1

Current conditions of the marine environment around the project area would continue, with no new LTFs constructed or log drops utilized for timber harvest from National Forest System lands on Gravina Island.

### Alternative 2

Alternative 2 is the only alternative that would construct a new land-to-barge bulkhead LTF in Bostwick Inlet; this would permanently displace approximately 0.25 acre of marine benthic habitat in Bostwick Inlet. The bulkhead would be constructed during low tides, which minimizes the potential for increasing suspended sediments in the water. The rock would be taken from rock pits near shore, and construction typically takes 2 weeks. The shape and length of the bulkhead, which would jut out into the water 200-250 feet, would alter existing currents and create eddies around the bulkhead. This may potentially increase food availability for marine organisms around the bulkhead by slowing the currents, but the effects are difficult to predict.

During operation, bark and debris would accumulate only in a small area around the extreme seaward end of the facility. Typically, this is an area of less than 600 square feet. The LTF would be decommissioned after sale closure; this would involve removing the bulkhead and storing the rock on shore. The marine habitat beneath the bulkhead "footprint" would likely



recover very slowly. Of the action alternatives, Alternative 2 would have the overall largest adverse effect on marine habitats in Bostwick Inlet, due to the construction of the LTF.

Also in this alternative, logs from helicopter yarding units would be flown directly to barges or log booms. Log booms or barges would be placed in coves and inlets close to the units being harvested, generally around the south end of Gravina Island. The most suitable locations are Phocena Bay (or Clarence Strait), Dall Bay (or Nichols Passage), and outer Bostwick Inlet. The exact locations of these barge or log boom drops would be determined by the purchaser, and would require a State permit. Helicopter-to-log boom would input more bark into the water than helicopter to barge. Barges are anchored for helicopter to barge drops, which would be an additional impact to the marine benthic habitat in those locations. However, their locations in deeper water would lessen this effect. In Alternative 2, a similar volume of timber would be transported to Phocena and Dall Bays as in Alternatives 4 and 5; but this alternative would transport the least volume to Bostwick Inlet of the action alternatives (Table 3-21).

### **Alternatives 3, 4, and 6**

These alternatives would connect the project transportation system to the existing Pacific Log and Lumber land-to-barge bulkhead on the Tongass Narrows. The greatest volume of timber would be transported to this site in Alternative 4, followed by Alternatives 3 and 6. During operation of the sale, impacts to the marine environment around the land-to-barge bulkhead would increase. However, bark deposition is expected to remain within the State-permitted maximum for all three alternatives, due to the strong currents in the Tongass Narrows that would quickly disperse any bark deposited, and the primary use of barges to transfer logs at the site.

For helicopter units not close to the road system, logs would be flown to a fully contained log barge or log boom. The effects would be similar to those described for Alternative 2; the magnitude of the effects would be proportional to the volume transported at each site. Of these alternatives, Alternative 4 would have the largest adverse effect, by transporting the most volume to four sites; Alternative 3 would have a lesser effect than Alternative 4, and Alternative 6 would have the least effect by transporting less volume to Bostwick Inlet (Table 3-21).

### **Alternative 5**

Alternative 5 would construct no roads, and all harvested logs would be flown to a fully contained log barge or a log boom for receiving and transporting to the mill. Log booms or barges would be placed in coves and inlets close to the units being harvested, generally around the south end of Gravina Island. The most suitable locations are Phocena Bay, Dall Bay, and Bostwick Inlet. The exact locations of these barge or log boom drops would be determined by the purchaser and require a State permit. The effects would be similar to those described for Alternative 2. Of the action alternatives, Alternative 5 would transport the largest volume to log drop sites, and have the second largest adverse effect (after Alternative 2) on Bostwick Inlet (Table 3-21).

## **Cumulative Effects**

Alaska Department of Natural Resources has indicated that they will move forward with a timber sale on State lands on Gravina Island regardless of activities on NFS lands. A State timber sale will involve overland transport of logs to the existing land-to-barge bulkhead at the Pacific Log and Lumber Sawmill on the Tongass Narrows. Although the impacts to the marine environment around the land-to-barge bulkhead site would increase, these impacts are expected to remain below the State permitted maximums.

The preferred alternative for Gravina Access Project Draft EIS is to construct a bridge from Revillagigedo Island to Pennock Island and then to Gravina Island. The preferred location is approximately 2.7 miles southeast of the airport along the Tongass Narrows. This project would not impact the marine environment at the Pacific Log and Lumber site.

At this time, there are no foreseeable effects from actions on other land ownerships on marine environments elsewhere around Gravina Island.

# 3 Environment and Effects

## **Alternative 1**

There would be no activities on NFS lands and no cumulative effect with the State sale on the marine environment at the Pacific Log and Lumber land-to-barge bulkhead on the Tongass Narrows.

## **Alternative 2**

In this alternative, no connecting roads would be built to the Pacific Log and Lumber land-to-barge bulkhead on the Tongass Narrows or across State lands. All impacts from the timber sale on NFS lands would be at the LTF at Bostwick Inlet, and at helicopter log drop locations around the south end of the island and the mouth of Bostwick Inlet. Impacts from the State sale would be confined to the Tongass Narrows land-to-barge bulkhead. There would be no cumulative effect between the Forest Service and State sales.

Impacts at the Bostwick Inlet site and at log drop locations would be the same as described under Direct and Indirect Effects, above.

## **Alternatives 3, 4, and 6**

In these alternatives, a connecting road would be built to the Pacific Log and Lumber land-to-barge bulkhead on the Tongass Narrows for transporting logs from the Forest Service timber sale. Impacts from the timber sale on NFS lands would be at the Tongass Narrows site, and at helicopter log drop locations around the south end of the island. Impacts from the State sale would also be at the Tongass Narrows site, and there would be a cumulative adverse effect from the Forest Service and State sales at that site. However, the strong currents along the Tongass Narrows, and the use of barges to transfer logs, are expected to minimize bark deposition at the site.

Impacts at the log drop locations would be the same as described under Direct and Indirect Effects, above.

## **Alternative 5**

In this alternative, no connecting roads are built to the Pacific Log and Lumber land-to-barge bulkhead on the Tongass Narrows or across State lands. All impacts from the timber sale on NFS lands would be at helicopter log drop locations around the south end of the island. Impacts from the State sale would be confined to the Pacific Log and Lumber site on the Tongass Narrows, and there would be no cumulative effect between the Forest Service and State sales.

Impacts at the log drop locations would be the same as described under Direct and Indirect Effects, above.

## Watersheds and Fisheries

This section summarizes fish and water data collected for the Gravina Island Timber Sale, and analyzes proposed harvest areas and road locations. The Gravina Island Timber Sale does not require a Watershed Analysis because the Forest Plan Standards and Guidelines would be implemented on all stream courses in the project area. Although not required, our analysis used portions of the landscape level assessment component in the USDA Forest Service Alaska Region (R10) *Watershed Analysis Handbook* (Draft Version 2, 1997) to help characterize and analyze the project area. See the Gravina Island Timber Sale Fish and Water Resource Report in the project planning record for additional information.

### Methods of Assessment

The objective of watershed assessment is to identify areas where proposed activities may pose a risk to water quality and fish habitat, by increasing sediment levels in the stream systems. In the landscape level assessment, watersheds are compared in terms of geomorphic risk (the topography and soils in the watershed), fish habitat availability, and fish habitat production capability.

The second level of assessment, site-specific, looks at streams within the watersheds that were identified as concerns in the landscape-level assessment. Site-level analysis relies on ground verification, and identifies sensitive areas, important habitat, and potential risks associated with proposed management activities in the project area. Field visit locations for the Gravina project area were chosen based upon Island/Landscape Assessment findings, Alaska Department of Fish and Game (ADFG) escapement numbers, and ADFG Anadromous Waters Stream catalog.

Field visits are designed to focus on downstream fish habitat, riparian areas nearby or within potential harvest areas, and the stream channels that connect downstream fish habitat to potential harvest areas. Stream characteristics are recorded according to the R-10 Channel Type Guide and the R-10 Tier I Stream Survey Protocol. Appropriate Riparian Standards and Guidelines are applied to the project based on information gathered in this process. The Riparian Standards and Guidelines were specifically developed through a collaborative effort involving leading watershed and fisheries scientists from Federal (management and research) and State (ADFG, ADEC) agencies. Standards and Guidelines were conservatively established to avoid any additional impacts to aquatic resources from management activities.

## Affected Environment

### Project Area Watersheds

The Gravina project area is divided into eleven watersheds (Figure 3-4). Some of these watersheds incorporate several smaller watersheds (i.e. separate and distinct drainage areas). Six of these watersheds met the criteria for Tier I stream surveys. Tier I criteria require at least a 3rd-order stream system and a watershed area greater than 1.0 square mile. These six watersheds were also selected due to the presence of anadromous and resident fisheries in these watersheds, and the level of proposed activity. The other five watersheds (01, 06, 07, 08, 09) did not meet all of these criteria and were not included in our analysis.

The six watersheds selected were: Vallenar (02), South Bostwick (03), Bostwick (04), Westside (05), Nelson (10), and Dall (11) (see Figure 3-4). These watersheds ranged in size from 1.0 square mile to 16.9 square miles for the largest (Bostwick). The two largest watersheds with the greatest salmon production are Bostwick and Vallenar. The Bostwick watershed drains approximately 10,000 acres south to Bostwick Inlet. The Vallenar watershed drains approximately 3,000 acres north to Vallenar Bay.

Tier I stream surveys were completed on the six watersheds in 1999 and 2000. The Tier I survey provides reconnaissance information to enable application of Forest-wide Standards and



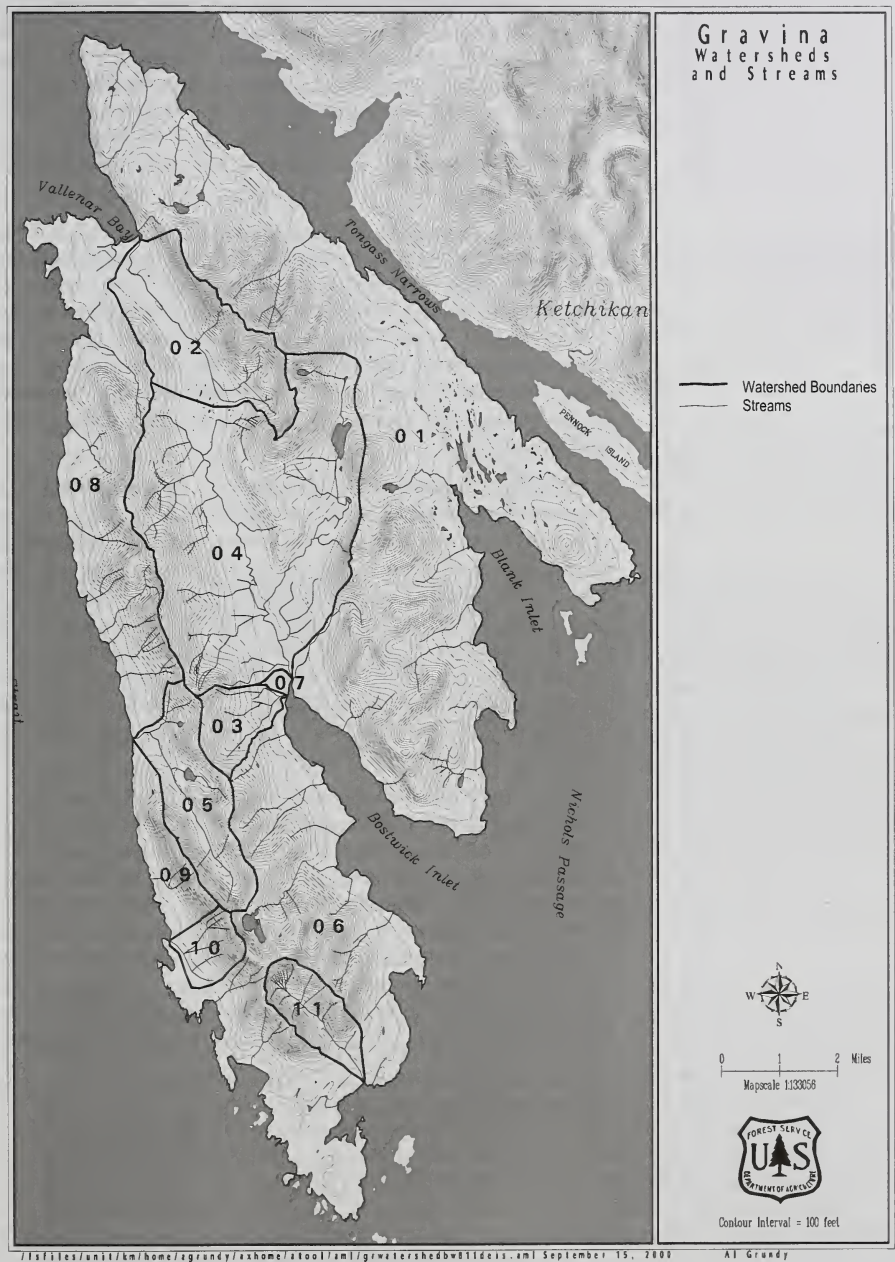
# 3 Environment and Effects

Guidelines for fish habitat and water quality. The survey includes the following measurements or observations:

- Verify or identify channel type at least to stream channel process group,
- Add previously unmapped streams to the GIS spatial database,
- Verify or identify fish value class as I, II, II or IV (USDA 1997b),
- Note management concerns or issues.

This survey information is on file at the Ketchikan-Misty Fiords Ranger District office.

Figure 3-4  
Gravina Watersheds



Source: GIS, A. Grundy, 2000

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## Geomorphic Risk Assessment

Hydrologists characterize sections of streams into categories, based upon the channel type gradient, to describe their ability to carry sediment. The three broad channel categories are transport, transitional, and depositional channels. Transport channels are considered sediment sources for watersheds, and have an average stream gradient of 6 percent or greater. Sediments that are created or introduced into transport channels are carried downstream. Depositional streams function as sediment sorting and storage areas, and have an average stream gradient of less than 2 percent. Floodplains and estuaries are examples of depositional channel types. Salmonids prefer depositional channels for spawning and rearing. Transitional channels occur between transport and depositional channels. They function primarily as transport channels, and have stream gradients between 2 and 6 percent. Depending on streamflow, transitional channels will temporarily store sediment, but eventually high flows will move the stored sediment downstream.

The Geomorphic Risk Assessment (GRA) evaluates multiple, hydrologically-independent watersheds. It is a large-scale screening process based on percent disturbance, mass-movement potential, drainage efficiency and other watershed characteristics (Ted Gier, 1998). Individual watersheds are the basic units of analysis. Two risk indices are developed for each watershed which evaluate (1) characteristics related to sediment supply and transport, and (2) the extent of storage (depositional) streams. As a rule, watersheds with high transport potential have steeper slopes, more unstable soils, and higher stream densities. Watersheds with a high storage potential have higher densities of low-gradient depositional streams for medium and long-term sediment storage.

In the GRA, transport and storage indices are combined into an overall Sediment Risk Index (SRI); see Table 3-22. The SRI is a relative ranking that gives a score of 100 to the watershed in the analysis area with highest risk of transporting sediment to depositional areas. All watersheds included in the GRA are assigned scores relative to the watershed receiving the score of 100. The SRI helps identify risk by assigning numerical rankings to watersheds based upon a combination of their physical characteristics, such as gradient and landforms associated with the watershed. A high SRI value is interpreted to mean the potential for risk appears to be high, under the assumption that watersheds with high combinations of storage potential and transport potential represent the highest levels of concern for management activities. Watersheds with a high SRI usually have steep, unstable valley walls, which drain into well-developed, low-gradient valley bottom channels.

There are at least two important assumptions implicit in the SRI. First, the SRI assumes that watersheds with the higher combinations of storage potential and transport potential have higher levels of management concern because material transported from steep, unstable areas can remain in low-gradient valley-bottom streams, resulting in pool filling and other undesirable channel adjustments. A secondary assumption is that all transport streams within the watershed drain into depositional streams. The SRI index does not analyze sediment routing through the stream network, and may overestimate sediment risk in a watershed. For example, in a watershed with a wetland complex on a plateau draining down a mountainside into saltwater, many of the transport streams are downstream of the depositional areas (the wetland complex) and would not transport sediment into a depositional reach.

The SRI ranking also considers the effects of previous management activities; these are discussed below for each watershed.



Table 3-22  
Gravina Island Watershed SRI Rankings

Watershed	Past Harvest as Percent of Watershed Acres	Sediment Risk Index (SRI)
Vallenar (02)	17	66
S. Bostwick (03)	0	40
Bostwick (04)	0	62
West-side (05)	0	48
Nelson (10)	8	86
Dall (11)	0	100

Source: GIS, C. Thomas, 2000

**Dall watershed (11)**, which drains into Dall Bay, has the highest naturally occurring sediment risk. This highest score, 100, is explained by two factors. First, the stream network is located in a very simple U-shaped glacial valley and the sidewalls of the valley are steep. Mountains surround the valley, which in turn increases drainage energy values in the model. Second, the headwall in the watershed has numerous streams on bare slopes. Compared to other watersheds on Gravina Island, there are more streams per area on this steep bare slope.

**Nelson watershed (10)** has a SRI value of 86. Nelson watershed's high ranking is a function of mathematics in the SRI calculation. The watershed is relatively small. At slightly over a square mile, any measurable perturbation increases the SRI score. Nelson watershed had 60 acres of timber harvested in 1958. This past harvest is no longer having an affect on SRI value for this watershed.

**Vallenar watershed (02)** has a SRI value of 66. This watershed may in fact be under-represented based upon its geomorphic shape and how that shape is represented in the model. At least a third of this watershed has very low relief and contributes very little in way of water energy to the watershed. The west side of the watershed has a low ridge separating it from the next basin and it drains into a series of muskeg ponds. Conversely, the east side of the watershed is very steep and drains directly into salmon habitat. Furthermore, the east side has been roaded and 573 acres were clearcut harvested at the foot of this steep terrain in 1958. Approximately 2.9 miles of road were built, which are currently closed and revegetated. Past harvest and the revegetated road are no longer contributing factors to the SRI in this watershed. Some landslides have occurred on the harvested land. Harvest also occurred to the streambank on east side of Vallenar Creek for approximately 2,000 feet. This past harvest occurred along a floodplain channel type. Field review along this stream reach identified no barriers to anadromous migration; juvenile coho were observed throughout the reach. Channel movement along the harvested reach appears to have accelerated above expected levels, although this has not been quantified.

**Bostwick watershed (04)** has an SRI value of 62. There is some naturally occurring risk in some of the larger tributaries in this watershed. Unstable areas in some of the Bostwick sub-basins upwardly influence the SRI value. Yet, there is a substantial portion of low-relief acreage in this watershed and the streams draining much of this area are somewhat insensitive stream channels. This is especially true for the lower mainstem, a mostly low-gradient contained process group with bedrock showing in several locations on the streambed. Although the main channel is somewhat insensitive to deposition, some of the tributaries have sensitive reaches containing fish habitat. Therefore, Bostwick watershed will receive site-specific assessment on unstable stream reaches near potential harvest areas. Site-specific assessment is accomplished through interdisciplinary reconnaissance and project design, and during project implementation and final unit design.

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**West-side watershed (05)** is located in an Old-growth Reserve and has an almost median SRI at 48. No timber harvest activities are proposed within it. Therefore, this watershed is not analyzed in detail.

**South Bostwick watershed (03)** has an SRI of 40. This watershed had no previous timber harvest, has low relief compared to all the other watersheds, and it has relatively insensitive depositional channels. Sediment risk to fish habitat is low in this watershed.

In summary, Dall watershed (11) has the highest SRI ranking on Gravina Island. The portion of Dall watershed that has been identified as the highest risk, the steep slopes on the headwall of the watershed, would not be harvested in the Gravina Island project. Of the remaining watersheds, Vallenar watershed appears to have the greatest sediment risk due to channel movement, and therefore the most potential to influence fish habitat.

#### Fish Habitat and Stream Class

Streams are classified into four types based on fish production values. Class I streams provide spawning and rearing habitat for anadromous fish species (Pacific salmon). Class II streams support resident fish populations where no anadromous fish occur and otherwise do not meet Class I criteria. Class III streams are perennial streams that do not support fish populations, but have sufficient flow or transport sufficient sediment and debris to have an immediate influence on downstream water quality or fish habitat capability. Class IV streams are intermittent, ephemeral, and small perennial channels with insufficient flow or sediment transport capabilities to have an immediate influence on downstream water quality or fish habitat capability (Glossary, Forest Plan).

#### Fish Species

Stream surveys completed by Forest Service personnel indicated the presence of pink, coho, and chum salmon in the project area. Dolly Varden, cutthroat trout, and steelhead were also found to occur. While no model exists to predict smolt production, based on habitat capability, for chum salmon and steelhead, it is likely that the most productive spawning habitat for pink and coho salmon and Dolly Varden also provides productive habitat for chum salmon and steelhead smolts.

#### Habitat Availability

Analysis of habitat availability describes the distribution and quantity of fish-bearing streams for the six watersheds considered in detail on Gravina Island. Miles of fish-bearing streams (anadromous and resident) were calculated for each of the six watersheds (Table 3-23). Bostwick watershed has the most miles of fish habitat.

Table 3-23  
Habitat Availability Results

Watershed	Class I (mi.)	Class II (mi.)	Total Fish Habitat (mi.), Class I and II Streams
Vallenar (02)	4.8	0.7	5.5
S. Bostwick (03)	0.7	1.8	2.5
Bostwick (04)	20.6	7.1	27.7
West-side (05)	4.1	0.6	4.7
Nelson (10)	2.4	0	2.4
Dall (11)	0.9	2.2	3.1

Source: GIS, C. Thomas, 2000

#### Habitat Capability

For the Gravina project, "Habitat Capability" refers to the estimated number of salmon and Dolly Varden a watershed can produce. Values for this estimate come from summing the estimates made for each of the fish-bearing channel types within the watershed. Habitat capability models have been developed during the planning process for Management Indicator Species on the Tongass National Forest that assume a relationship between fish habitat

capability and the physical characteristics of a stream channel (channel type). Data used to develop these coefficients came from all known reliable sources of information in Southeast Alaska, including studies by the Alaska Department of Fish and Game, the National Marine Fisheries Service, the U.S. Fish and Wildlife Service, and the U.S. Forest Service. The indicator species used for this analysis include coho (*Oncorhynchus kisutch*) and pink salmon (*O. gorbuscha*) smolts for Class I habitat and Dolly Varden (*Salvelinus malma*) for Class I and resident Class II habitat. Smolts are the final output from streams on National Forest System administered lands to the open ocean.

## Salmon Smolt Habitat Capability Results

Predictions for salmon smolt production are presented in Table 3-24. Gravina's salmon smolt production was greatest in the two largest watersheds, Bostwick and Vallenar. The prediction for pink salmon smolt production was almost 10 times greater in these two watersheds than predicted pink smolt production in the next closest watershed, Nelson. The largest pink salmon smolt production estimate was 3.8 million smolts produced by the Vallenar watershed. Based upon field review, this appears to be accurate because even though Vallenar watershed is less than one third the size of Bostwick watershed, Vallenar has the greatest amount of high-quality pink salmon spawning gravel.

**Table 3-24**  
**Predicted Salmon Smolt Production<sup>1</sup>**

Watershed Species	Vallenar	S. Bostwick	Bostwick	West-side	Nelson	Dall
Pink smolts	3.8MM <sup>2</sup>	67M	2.2MM	150M	250M	120M
Coho smolts	6.5M	0.36M	19M	4.8M	1.3M	0.73M
Dolly Varden smolts	13M	0.61M	44M	6.4M	2.6M	4.5M

<sup>1</sup> No model exists for chum salmon or steelhead prediction

<sup>2</sup> M = 1000, MM = 1,000,000

Source: GIS, C. Thomas, 2000

## Coho Salmon Smolt Habitat Capability Results

Coho smolt capability estimates were greatest for Bostwick watershed (04). The smolt capability model predicts Bostwick can produce 19,000 coho smolts. See Table 3-24. This estimate appears consistent when reviewed in the context of stream characteristics and available habitat. Although the lower main-stem of Bostwick is relatively poor habitat (low-gradient contained channel), there is extensive over-wintering and rearing habitat for juvenile coho in the upper reaches of the watershed. In addition to Bostwick Lake and the ponds below the lake, Bostwick watershed has 4 miles of floodplain habitat and over 1/2 mile of low gradient alluvial fan habitat. This entire habitat is accessible to spawning and rearing coho.

Vallenar watershed has the second-highest estimate. The smolt capability model predicts Vallenar (02) can produce 6,500 coho smolts. The floodplain habitat in Vallenar appears responsible for this production estimate. Although stream attributes were not quantitatively measured for Vallenar, field review in 1999 verified complex floodplain habitat was present in much of the flood plain channel. Numerous coho juveniles were easily observed along stream margins in late June.

West-side watershed has the third-highest predicted coho smolt production at 4,800 smolts. To date, streams in this watershed have not been field reviewed, because no harvest will occur within this watershed. No other single watersheds on Gravina Island have sizable coho smolt production estimates.

## Dolly Varden Habitat Capability Results

Dolly Varden are often found above barriers and therefore are not influenced by anadromous immigration. Dolly Varden are therefore used as Management Indicator Species for resident Class II streams. Estimates of Dolly Varden production are also presented in Table 3-24. As



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expected, Dolly Varden predictions were greatest for Bostwick watershed. The model predicts that Bostwick can produce 44,000 Dolly Varden. The next highest estimate for a single watershed belongs to Vallenar watershed. The model predicts that Vallenar can produce 13,000 Dolly Varden. West-side (05) and Dall (11) watersheds have about the half the estimated numbers of Dolly Varden produced by Vallenar.

## Watershed Assessment Summary

Based on our assessment, Vallenar watershed appears to be the most susceptible to management-related impacts. Three conditions lead to this assumption: First, of the two largest fish-producing watersheds (Vallenar and Bostwick) on Gravina Island, Vallenar has the greater geomorphic risk (see Table 3-22). Second, there is some destabilized floodplain habitat that may have been caused by past streamside harvest. Finally, Vallenar produces the most pink salmon of all island streams and has moderate coho and chum production, based on field survey information.

## Riparian Management Areas

Riparian Management Areas (RMAs) are defined as the areas identified during project planning that directly affect the form and function of aquatic ecosystems, stream processes and the quality and quantity of fish habitat. RMAs are intended to highlight areas of special concern to fish and other aquatic resources, and include the stream channel and adjacent lands that have a direct effect on aquatic habitat. The Forest Plan requires that RMAs be identified and delineated where disturbance activities would occur. Riparian Management Areas were crafted for the project area based on guidelines provided in the *Aquatic Ecosystem Management Handbook* (FSH 2090). After the stream layer was updated with field verified information gathered in April 1998 and summer 1999, the RMA identification was completed. The RMAs are shown on the unit card maps in Appendix B of the Draft EIS.

## Environmental Consequences

### Effects of Timber Harvest

Long-term studies on the Tongass National Forest that quantify direct impacts from timber harvest activity do not yet exist. To address concerns that arose regarding the long-term viability of fish habitat during the last Forest Plan revision, Congress assigned a panel of fisheries and hydrology experts to assess the potential impacts land management activities might have on fish habitat in Alaska. The panel presented their findings to Congress in January 1995 in a document titled *Anadromous Fish Habitat Assessment (AFHA)*. Findings presented in AFHA were directly incorporated into Fish Standards and Guidelines in the Forest Plan. When stream course protection measures from the Forest Plan Standards and Guidelines are applied, fish habitat degradation is expected to be negligible (Forest Plan Record of Decision).

Forest Plan Standards and Guidelines, Best Management Practices, and Riparian Management Areas would be fully implemented in all action alternatives. Site-specific information is in the unit cards in Appendix B of the Gravina Island Draft EIS. Acres of proposed harvest by watershed and alternative are presented in Table 3-25.

Table 3-25  
Proposed Harvest Acres Listed by Watershed and Alternative

Watershed	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
Vallenar (02)	169	121	170	0	121
South Bostwick (03)	5	33	32	0	33
Bostwick (04)	1,049	1,043	1,056	0	954
West-Side (05)	0	0	0	0	0
Nelson (10)	85	85	85	85	85
Dall (11)	8	41	64	64	41
Other Watersheds <sup>1</sup>	485	495	807	654	328
<b>Total Acres</b>	<b>1,801</b>	<b>1,818</b>	<b>2,218</b>	<b>803</b>	<b>1,562</b>

<sup>1</sup>Other watersheds excluded from analysis in "Watershed Assessment"

Source: GIS, C. Thomas, 2000

**Dall watershed (11):** No adverse effects are anticipated in this watershed, as all timber harvests would be accomplished using helicopter yarding, and silvical prescriptions featuring a combination of even-aged, two-aged, and uneven-aged prescriptions. Helicopter yarding generally has the least amount of ground disturbance of the yarding methods. Alternative 2 proposes the least acres of harvest while Alternatives 4 and 5 contain the most acres. The units are adjacent to and above Class I and II streams; no-cut buffers would be applied according to Forest Plan Standards and Guidelines. Additionally harvest units are located in the lower reaches of this watershed which are not nearly as steep.

**Nelson watershed (10):** All action alternatives propose the same acres of harvest (Units 75, 80, and 81). No adverse effects are anticipated in this watershed as all timber harvests would be accomplished using helicopter yarding, and silvical prescriptions featuring single-tree selection. All three units border Class I and III streams. No-cut buffers would be applied according to Forest Plan Standards and Guidelines.

**Vallenar watershed (02):** Alternative 5 proposes no harvest in this watershed and would not affect fish habitat. Alternatives 2 and 4 would require three stream crossings and harvests 170 acres, while Alternatives 3 and 6 would require one stream crossing and harvest about 121 acres. No-cut buffers would be applied according to Forest Plan Standards and Guidelines. Any adverse affects to fish habitat are anticipated to be very minor due to the application of no-cut buffers, a very small portion of the watershed being treated (4 to 5 percent), and half of those harvested units are accomplished with helicopter yarding.

**Bostwick watershed (04):** Alternative 5 proposes no harvest in this watershed and would not affect fish habitat. Alternative 6 proposes the second-lowest acres of harvest, while Alternatives 2, 3, and 4 propose similar acres of harvest. No-cut buffers would be applied according to Forest Plan Standards and Guidelines. Any adverse affects to fish habitat are anticipated to be very minor due to the application of no-cut buffers, a very small portion of the watershed being treated (10 percent), and about one-third of those harvested units are accomplished with helicopter yarding.

**West-side watershed (05):** No timber harvest is proposed in this watershed under any alternative so there should be no adverse affects on fish habitat.

**South Bostwick watershed (03):** Alternative 5 proposes no harvest in this watershed and would not affect fish habitat. Alternative 2 proposes harvest of Unit 56 in this watershed, and Alternatives 3, 4, and 6 propose harvest of three units (Units 56, 61, and 62). All of these units are proposed for helicopter harvest. Units 56, 61 and 62 are adjacent to Class III streams and proposed for even-aged prescriptions. No-cut buffers would be applied according to Forest Plan Standards and Guidelines.

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## Water Temperature

Mandatory no-cut buffers established on all Class I – III streams for all alternatives would significantly reduce the likelihood of temperature-related effects to streams within the Gravina project area. Proposed timber harvest units located next to Class I and II streams provide a minimum 100-foot horizontal no-cut buffer between the unit and streams. Class III streams receive a no-cut buffer from the edge of the channel to the first slope break. Class IV streams do not receive mandatory no-cut buffers under the Forest Plan. No significant effects are expected on water temperature under any of the action alternatives.

## Large Woody Debris

Mandatory no-cut buffers established along all Class I – III streams on all action alternatives decreases the likelihood of a reduction in the short or long-term recruitment of large wood to streams within the Gravina project area. There is no anticipated reduction of large wood recruitment in the Gravina project area.

## Effects of Roads

Vallenar and Bostwick watersheds have the highest fish production capability and miles of anadromous fish stream, as well as the most miles of proposed road (Table 3-26). Of the four roaded alternatives, Alternatives 3 and 6 were designed to reduce sediment risk in Vallenar and Bostwick watersheds. (See the discussion under Direct and Indirect Effects in this section).

Table 3-26  
Proposed Miles of Road Listed by Watershed and Alternative

Watershed	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
Other watersheds <sup>1</sup>	4.0	2.8	3.6	0	1.3
Vallenar (02)	1.2	0.6	1.2	0	.6
Bostwick (04)	14.8	18.7	17.4	0	15.5
<b>Total Miles</b>	<b>20.0</b>	<b>22.1</b>	<b>22.2</b>	<b>0</b>	<b>17.4</b>

<sup>1</sup>Other Watersheds include roads mainly in watershed (01), which is a composite of multiple watersheds on non-National Forest System lands.

Source: C. Rose, GIS, 2004

## Stream Crossings

Currently, National Forest System road construction and maintenance is debated nationally (USDA 2000, USDA 2000b). On the Tongass, past road construction practices have impaired some fish passage. The Tongass National Forest Annual Monitoring & Evaluation Report for Fiscal Year 2001 (Forest Plan Monitoring Report 2001) found approximately 59 percent of existing Class I, and 78 percent of Class II fish habitat crossings do not meet current fish passage standards. Fish passage standards are based upon assumptions agreed to by members of an interagency team that included hydrologists, biologists and engineers from the USDA Forest Service, Alaska Department of Fish and Game, and the Alaska Department of Transportation (Forest Plan Monitoring Report 2001). In recent years, the Tongass National Forest has begun a field survey effort that will characterize all road crossings and identify passage deficiencies (USDA, Forest Service, 1999). Through monitoring and survey analysis, Tongass staff members have a better understanding of fish passage requirements. New fish passage construction methods resulting from this understanding are expected to successfully provide fish passage at new culvert installations. Permanent bridges, temporary log stringer bridges, oversized culverts and open arch culverts will be used to ensure fish passage on all Class I and II streams within the Gravina project area. These methods will be applied for this project.

When designing new roads, Forest transportation specialists currently attempt to avoid road locations that cross fish streams, and minimize the number of crossings when avoidance is not possible. When crossing fish habitat is necessary, roads are designed to minimize impacts to proper stream function and provide passage to both anadromous and resident fish (Table 3-27).



All structures (bridges, stringer bridges, culverts) crossing Class I and II fish habitat in the Gravina Island Timber Sale project would be designed to provide passage for juvenile and adult salmonids in accordance with the agreed upon passage standards (Forest Plan Monitoring Report 2001). All road-related activities, including road location and construction would follow all appropriate Best Management Practices (BMPs) as outlined in the Forest Service Handbook (FSH 2509.22).

**Table 3-27**  
**Passage and Timing Requirements for Gravina Streams**

Road Number	Stream Class	Passage	Alternative	Timing
8105100-3	I	Yes	2,3,4	Yes
8100300-3	II	Yes	2,3,4,6	Yes
8100000-4	I	Yes	2,3,4,6	Yes
8100300	I	Yes	2,3,4,6	Yes
8100300	II	Yes	2,3,4,6	Yes
8100000-4	I	Yes	2,3,4,6	Yes
8100000-5	III	No	2,3,4,6	Yes
8100000-5	II	Yes	2,3,4,6	No
8100000-5	II	Yes	2,3,4,6	No
8100000-6	I	Yes	2,4	Yes
8100000-6	I	Yes	2,4	Yes
8100000-7	II	Yes	2,4	Yes
8105000-1	II	Yes	2,3,4	No
8100000-3	III	No	2,3,4,6	Yes
8100000-2	II	Yes	2,3,4,6	No
8100000-2	II	Yes	2,3,4,6	No
8105000-2	I	Yes	3,6	Yes
8100000-2	II	Yes	2,3,4,6	No
8100000-1	I	Yes	3,4,6	Yes
8100200	II	Yes	2,3,4,6	Yes
8100200	III	No	2,3,4,6	Yes

Source: C. Thomas, J. Oien, 2000, 2002

In-stream construction is restricted on Class I streams to a specific time of the year to protect critical freshwater life phases of Pacific salmon. A Class I designation is given to streams and lakes that contain "anadromous or adfluvial fish habitat" (adfluvial habitat is a lake tributary that provides spawning and juvenile rearing habitat for salmonids that grow to maturity in a lake and then return to spawn in the lake tributary). Timing is applied to those Class I streams that support known populations of Pacific salmon. Timing is sometimes recommended for Class II and III streams when they are close to Class I spawning habitat, and in-stream road construction is likely to have an immediate impact on the Class I habitat downstream of the road construction activity. Periods (timing windows) when in-stream construction is permitted to occur coincide with absence of both spawning adult salmon and salmon eggs or larval salmon in the gravel (Table 3-28).

The timing restrictions in Table 3-28 are generic; the restrictions prevent in-stream construction from occurring during those times when salmon are expected to be in the stream. Timing windows can be altered, should stream-specific information be identified for the Gravina

# 3 Environment and Effects

Timber Sale project area that shows salmon are present during time periods different than those described in the generic timing windows.

Table 3-28  
Timing Windows for In-stream Road Construction

Species	Timing Window
Pink / Chum	June 1 to August 3
Coho	June 15 to September 1
Steelhead	July 18 to August 15

Source: FSH 2090.21 30, Aquatic Habitat Management Handbook

## Monitoring

In addition to monitoring required by the Forest Plan, a Channel Condition Assessment (CCA) site has been established on Bostwick Creek. CCA sites measure physical stream attributes. The site on Bostwick Creek is located below proposed harvest and road building in a previously unmanaged watershed. The site would be re-measured after management activity occurs and added to the Forest stream monitoring database.

## Direct and Indirect Effects

### Alternative 1

No new harvest or road building would occur in this alternative. Any new fish or water consequences in this alternative would be caused by naturally occurring disturbances. The No-action Alternative is presented as a baseline of comparison for the action alternatives.

### Alternative 2

Alternative 2 is ranked as having the highest potential, of the five action alternatives, to affect fish and water resources, based on the number of stream crossings. There is a total of 28 road crossings over Class I, II, and III streams in this alternative. This is the only alternative that proposes an LTF to be constructed in Bostwick Inlet, which would be decommissioned after the closure of the sale. This alternative also proposes two bridge crossings on Bostwick Creek, one about 1/2 mile from the estuary, and another over coho spawning and rearing habitat on the upper mainstem. This alternative proposes 16 road crossings on the fish-bearing streams in Bostwick watershed, and 9 road crossings over Bostwick watershed streams that do not contain fish.

Three road crossings over non-fishbearing streams would be required in Vallenar watershed. One of the three road crossings will be across upper Vallenar Creek (most likely a bridge). Risk to fish habitat in Vallenar watershed as a result of Alternative 2 is assumed to be greater than the risk resulting from actions proposed in Alternatives 3 and 4. This assumption is based upon high-quality anadromous fish habitat downstream of the proposed activity and the instability of the channel near the proposed road-crossing site. Vallenar currently has 17 percent of the watershed harvested and contains 2.9 miles of closed road, which is revegetated and in stable condition.

Timing would be required for in-stream work on all Class I streams. Timing restrictions may also be required on some Class II and III streams that flow directly into a Class I stream.

Classified roads in Alternative 2 would be placed in Maintenance Level 1 after harvest activities have concluded. Vehicle traffic would not be permitted, some pipes would be removed, and the road may be placed into storage in as maintenance-free a condition as possible. Temporary roads would be decommissioned (permanently closed) after the timber sale was complete. This includes removing all pipes on temporary roads from stream crossings and restoring the channel profile at the stream crossings so that the banks slope at a minimum of 1.5 to 1 ratio.

## **Alternative 3**

Alternative 3 is ranked as having the third-highest potential, of the five action alternatives, to affect fish and water resources, based on the number of stream crossings. This alternative has a total of 23 mapped stream crossings; timing restrictions would be required for Class I stream crossings. Alternative 3 creates the second-least risk of the four roaded alternatives (2, 3, 4, and 6) because Alternative 3 avoids crossing Vallenar mainstem, and it has the second-fewest number of stream crossings behind Alternative 6.

Alternative 3 would gain access to the project area by building a road from the Tongass Narrows. This alternative has one proposed bridge crossing on the upper Bostwick Creek, and it would have one proposed bridge crossing on the tributary that drains Bostwick Lake. The proposed roads in this alternative cross 13 mapped fish-bearing streams, and 8 mapped streams that do not contain fish in the Bostwick watershed. Roads in this alternative would also cross one mapped stream in Vallenar watershed that does not contain fish, and one mapped fish-bearing stream.

Classified roads in Alternative 3 would be closed (placed in Maintenance Level 1) after harvest activities have concluded. Vehicle traffic will not be permitted, some pipes will be removed, and the road would be placed into storage in as maintenance free a condition as possible. Temporary roads would be decommissioned (permanently closed) after the timber sale was complete. This includes removing pipes from stream crossings and restoring the channel profile at the stream crossings so that the banks slope at a minimum of 1.5 to 1 ratio.

## **Alternative 4**

Alternative 4 is ranked as having the second-highest potential, of the five action alternatives, to affect fish and water resources, based on the number of stream crossings. There is a total of 27 road crossings over Class I, II, and III streams in this alternative; timing restrictions would be required for Class I stream crossings. Timing may also be required on some Class II and III streams that flow directly into a Class I stream. This alternative would access the project area by building a road across Gravina Island from the Tongass Narrows. This alternative would cross Bostwick mainstem twice and it would also cross the tributary that drains Bostwick Lake. There are a total of 15 crossings over fish-bearing streams, and 9 stream crossings over streams that do not contain fish in the Bostwick watershed. This alternative has the same crossings and associated risk for Vallenar watershed as discussed in Alternative 2 (three crossings).

A portion of the classified (mainline) roads built in this alternative would remain open and would be maintained to provide access for all vehicles (Maintenance Level 3). The remainder of the classified roads would be closed (Maintenance Level 1) upon completion of harvest activities. Temporary roads would be decommissioned. This includes removing pipes from stream crossings on all temporary roads and restoring the channel profile at the stream crossings so that the banks slope at a minimum of 1.5 to 1 ratio.

## **Alternative 5**

Alternative 5 is ranked as having the least potential, of the five action alternatives, to affect fish and water resources. Alternative 5 requires no road building and no cable harvest. Without roads, minimum alteration of stream flow and water drainage patterns is expected. No Class I fish timing is required by this alternative.

## **Alternative 6**

Alternative 6 is ranked as having the fourth-highest potential, of the five action alternatives, to affect fish and water resources. Alternative 6 creates the least risk of the four roaded alternatives because Alternative 6 avoids crossing Vallenar mainstem, and it has the fewest number of stream crossings. This alternative has a total of 21 mapped stream crossings; timing restrictions would be required for Class I stream crossings.

Alternative 6 would gain access to the project area by building a road across Gravina from the Tongass Narrows. This alternative has one proposed bridge crossing on the upper Bostwick Creek, and it has one proposed bridge crossing on the tributary that drains Bostwick Lake. The



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proposed roads in this alternative cross 11 mapped fish-bearing streams, and 8 mapped streams that do not contain fish in the Bostwick watershed. Roads in this alternative also would cross one mapped stream in Vallenar watershed that does not contain fish, and one mapped fish-bearing stream.

Classified roads built in this alternative would be closed after harvest activities have concluded. Classified roads in Alternative 6 would be closed (placed in Maintenance Level 1) after harvest activities have concluded. Vehicle traffic would not be allowed, some pipes will be removed, and the road would be placed into storage in as maintenance-free a condition as possible. Temporary roads would be decommissioned after the timber sale was complete. This includes removing pipes from stream crossings and restoring the channel profile at the stream crossings so that the banks slope at a minimum of 1.5 to 1 ratio.

#### Cumulative Effects

Each of the six watersheds selected for analysis were also analyzed for cumulative effects. These watersheds represent a reasonable area for cumulative effects analysis, as watershed effects do not extend to the other watersheds. No cumulative effects are anticipated in watersheds 3, 5, or 11 as there are no other ownerships, past activities, or future activities to consider. No cumulative effects in watershed 10 are anticipated as past timber harvest activities are no longer having an affect and there are no other ownerships, or future activities to consider.

Cumulative effects are anticipated in watersheds 2 (Vallenar) and 4 (Bostwick) due to past and future activities. In addition to proposed activity on National Forest System land, Alaska Department of Natural Resources (DNR) is planning a timber sale on State lands on Gravina Island in the Bostwick watershed; this harvest will occur regardless of the project alternative selected by the Forest Service. Harvest on all lands will follow the State Forest Practices Act. Stream buffers will be implemented according to the State Forest Practices Act.

**Bostwick watershed (04):** In the Bostwick watershed, DNR may build up to 3.8 miles of road to harvest up to 488 acres. Harvest would likely occur adjacent to 550 feet of Class I habitat, 1,500 feet of Class II, and 3,000 feet of Class III habitat. When combined with Forest Service harvest, timber harvest could range from 1,442 and 1,544 acres depending on the alternative. This would result in harvest activity on 14 to 15 percent of the watershed.

Miles of road construction and stream crossings would also increase. Road miles would increase in a range by alternative from 18.6 to 22.5 miles in the Bostwick watershed. All the above activities are anticipated to occur in a relative short space of time.

In Alternatives 3, 4, or 6, the Forest Service would build a road from the airport to National Forest System managed land. This road would provide access to Alaska Department of Natural Resources, Alaska Mental Health Trust (AMHT), and University of Alaska (University) lands. In Alternative 2, the Forest Service would not build this road; in this case, DNR would build a similar road on State lands, bypassing NFS lands and routed closer to Bostwick Lake. About a mile of this road would fall within the Bostwick watershed.

Any adverse affects to fish habitat are anticipated to be minor due to the application of no-cut buffers, a small portion of the watershed being treated (14 to 15 percent), and about one-quarter of those harvested units are accomplished with helicopter yarding.

**Vallenar watershed (02):** In addition to Forest Service harvest activities in the Vallenar watershed, DNR may build/reconstruct up to 2.3 miles of road to harvest approximately 248 acres. The road building and harvest would occur on relatively gentle lands on the western side of Vallenar watershed. A bridge crossing over adult salmon habitat in Vallenar Creek would be required on DNR land. Potential DNR harvest in the Vallenar watershed does not occur next to any Class I, II, or III stream. Past timber harvest is no longer having an affect on fish habitat, although there is some stream channel instability. Private property development is occurring and is anticipated to continue as land becomes available. Development in close

proximity to streams may cause adverse effects. This is assumed to be minimal as lots are generally large (>5 acres) and most lots are located on upland areas, away from Vallenar Creek.

Any adverse effects to fish habitat are anticipated to be minor due to the application of no-cut buffers, a small portion of the watershed being treated (12 to 14 percent), and about one-quarter of those harvested units are accomplished with helicopter yarding.

**Other Activities:** Across the ridge to the west of Vallenar watershed, on the northwest tip of Gravina Island, DNR, under an agreement with the University of Alaska, may build up to 2.5 miles of new road to harvest up to 322 acres. It is anticipated that harvest on all lands will follow the State Forest Practices Act. Stream buffers will be implemented according to the State Forest Practices Act. This harvest area does not occur in any of the six watersheds analyzed in detail in the Gravina Island Timber Sale Fish and Water Resource Report.

In the Government Creek watershed, DNR, under an agreement with AMHT, may harvest up to 39 acres from mainline road 8100000 constructed by the Forest Service. Government Creek enters Tongass Narrows approximately 200 feet south of the Ketchikan International Airport runway. Government Creek watershed was not studied independently in the Gravina Island Timber Sale Fish and Water Resource Report. Some harvest will likely occur adjacent to Class II and III tributaries to Government Creek; the habitat has not been field identified.

According to the agreement between the National Marine Fisheries Service (NMFS) and the Forest Service dated August 25, 2000, this assessment will include 1) a description of the Proposed Action; 2) an analysis of individual and cumulative effects of the action on EFH, the managed species, and associated species such as major prey species, including affected life histories; 3) the Forest Service's views regarding effects on EFH; and 4) a discussion of proposed mitigation, if applicable.

The EFH for this project includes all segments of the streams and the lakes where salmon reside during any period of the year. This essentially includes all Class I stream and lake habitat within the project area and is shown in Figure 3-5 and Table 3-22.

In the Draft EIS, we determined that this project "may adversely affect EFH" if any of the action alternatives are selected, but that this risk is minimal through the implementation of Forest Plan Standards and Guidelines.

The Proposed Action is a timber sale and associated road construction on National Forest System (NFS) lands on Gravina Island. The Proposed Action and all of the alternatives to it are described in Chapter 2 of the Draft and Final EIS.

For this timber sale, the anadromous salmonids include coho, pink, and chum salmon, and steelhead. Adults of these species spawn in the lower reaches of watersheds with planned upstream timber harvest and road construction. Salmon eggs incubate in those streams and juvenile coho rear in the streams downstream from the planned timber sale activity. Juvenile coho feed predominantly on aquatic and terrestrial insects. The other fish species and life stages generally do not feed in freshwater.

Potential effects of timber harvest and roadbuilding on EFH may be degraded water quality and altered physical stream habitat. Degraded water quality may include increased water temperature or suspended sediment. Potential changes in physical habitat may include reduced pool volume, due to filling from sedimentation and changes in composition of the substrate. Pool volume is important to rearing and over-wintering of juvenile coho. Increased fine sediment in the substrate can reduce survival of salmon eggs and change the assemblages of aquatic insects used by fish for food.

The Forest Service anticipates no detectable effects on fish habitat due to implementation of the timber sale. We would implement the Standards and Guidelines for protection of fish habitat from the Forest Plan and the applicable Best Management Practices. The Standards and

## Essential Fish Habitat Assessment

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Guidelines and the BMPs have been developed through interagency negotiation and are believed to provide “state-of-the art” protection of fish habitat.

Potential effects of the project on essential fish habitat were discussed in the Draft EIS. This discussion includes a description of the Essential Fish Habitat in the project area, a description of the proposed activities, and a description of the proposed mitigation measures that would be implemented to protect these essential habitats. The Draft EIS was provided to the National Marine Fisheries Service to formally initiate the consultation process, according to the agreement between the Forest Service and the National Marine Fisheries Service on the method to complete Essential Fish Habitat consultation using the National Environmental Policy Act Procedures. The agreement was provided as direction on August 25, 2000. The descriptions and the analysis led the Forest Service to a determination that the Gravina Island Timber Sale is unlikely to adversely affect Essential Fish Habitat if Forest Plan Standards and Guidelines and Best Management Practices (BMPs) are implemented. The National Marine Fisheries Service responded in a letter dated August 13, 2002, concurring that this project may adversely affect EFH unless Standards and Guidelines from the Forest Plan and BMPs are implemented. NMFS stated that Alternative 3 achieves an optimal balance between the harvest of trees and the conservation of fish and aquatic resources. NMFS also recommended that the Forest Service try to minimize road building activities and stream crossings that could impact EFH. The Forest Service responded to NMFS in a letter dated January 7, 2003 and addressed their concerns and recommendations, stating that all stream crossings would have structures installed such as bridges, oversized culverts, or open arch culverts that would ensure passage on all fish streams within the project area. At this point, formal Essential Fish Habitat consultation has been complied with in accordance with the agreement between the Forest Service and the National Marine Fisheries Service.



Figure 3-5  
Essential Fish Habitat on Gravina Island



Source: GIS, A. Grundy, 2000

## Recreation

This section summarizes recreation data collected for the Gravina Island Timber Sale and analyzes the effects of proposed harvest and road construction. The Recreation Resource Report for the Gravina Island Timber Sale is tiered to the Forest Plan, Final EIS, Chapter 3 and Forest Plan, Chapter 3, Chapter 4 and Appendix E.

## Affected Environment

### Recreation Opportunity Spectrum

The Forest Service developed the Recreation Opportunity Spectrum (ROS) system to help identify, quantify, and describe the variety of recreation settings available on National Forest System lands. The ROS describes settings that are used to identify opportunities that may be affected or changed by various activities. The ROS system provides a framework for planning and managing recreation resources. The ROS settings are classified using a scale ranging from primitive to urban. Four different settings are found on Gravina Island, as described below.

Activities on adjacent lands along the eastern and northern sections of the Gravina Island may change the ROS settings. For example, another landowner with land adjacent to National Forest System lands could decide to harvest their timber up to the Forest boundary. This activity would prompt a re-evaluation of the ROS setting and may prompt necessary changes.

*Roaded Modified (1%):* The natural environment of this setting is substantially modified by land use activities. The opportunity to observe and affiliate with other users is common. There is little opportunity for challenge and risk, and self-reliance on outdoor skills is of little importance. The Roaded Modified setting on Gravina Island is the area above the airport and commercial properties along the Tongass Narrows. The sights and sounds of commercial and industrial activities, including canneries, mills, ferries, aircraft, and cruise ships, all contribute to the Roaded Modified setting. (This area was classified as Roaded Natural in the Gravina Island Draft EIS; after further review of TLMP and the definitions of ROS, we determined that the area above the industrial lands and airport on the north east side of Gravina Island more closely fits the remoteness definition of Roaded Modified than Roaded Natural.)

*Semi-Primitive Motorized (21%):* This setting defines natural or natural-appearing environment where interaction between users is low, but there is often evidence of other users. Along shorelines there may be extensive motorized boat traffic. The second most dominant ROS setting on Gravina Island is the Semi-Primitive Motorized area, which includes the shoreline areas along Blank Inlet and Bostwick Inlet, and along the shoreline to Dall Bay at the southeast end of the island. This side of the island is near town and the shipping lanes. The inlets are popular places for trips from Ketchikan and Metlakatla for boating, fishing, beachcombing, and other day-use activities. Black Sands Beach State Park and the proposed Dall Bay State Marine Park are recreation sites in this setting. The Dall Bay area has been identified by the State for a proposed State Marine Park.

*Semi-Primitive Non-Motorized (29%):* This setting defines a natural environment where interaction between users is very low and evidence of other users is minimal, but along saltwater shorelines there may be frequent motorized boat traffic. This setting makes up the largest portion of the planning area. The western side of the island is very remote, but the sights and sounds of other users, mostly boat traffic, limits the potential for a primitive recreation experience. This setting can also be found around the State land adjacent to Bostwick Lake. This area is also remote, but the sites and sounds of nearby Ketchikan can be heard. The Phocena Bay cabin is located in this Semi-Primitive Non-Motorized setting on the southwest portion of the island.

*Primitive (13%):* This setting encompasses essentially unmodified natural environment where interaction between users is very low, and evidence of other users is minimal. Motorized use is rare. Only a small portion of the island meets the definition of the Primitive setting. This setting is generally found within the interior of the island between Bostwick Inlet and Vallenar Bay, and receives little use.

A summary of the existing acreages by ROS class and the percent of the project area are displayed in Table 3-29. Figure 3-6 shows the locations of these ROS classes on Gravina Island.

Table 3-29  
Gravina Existing ROS Acres

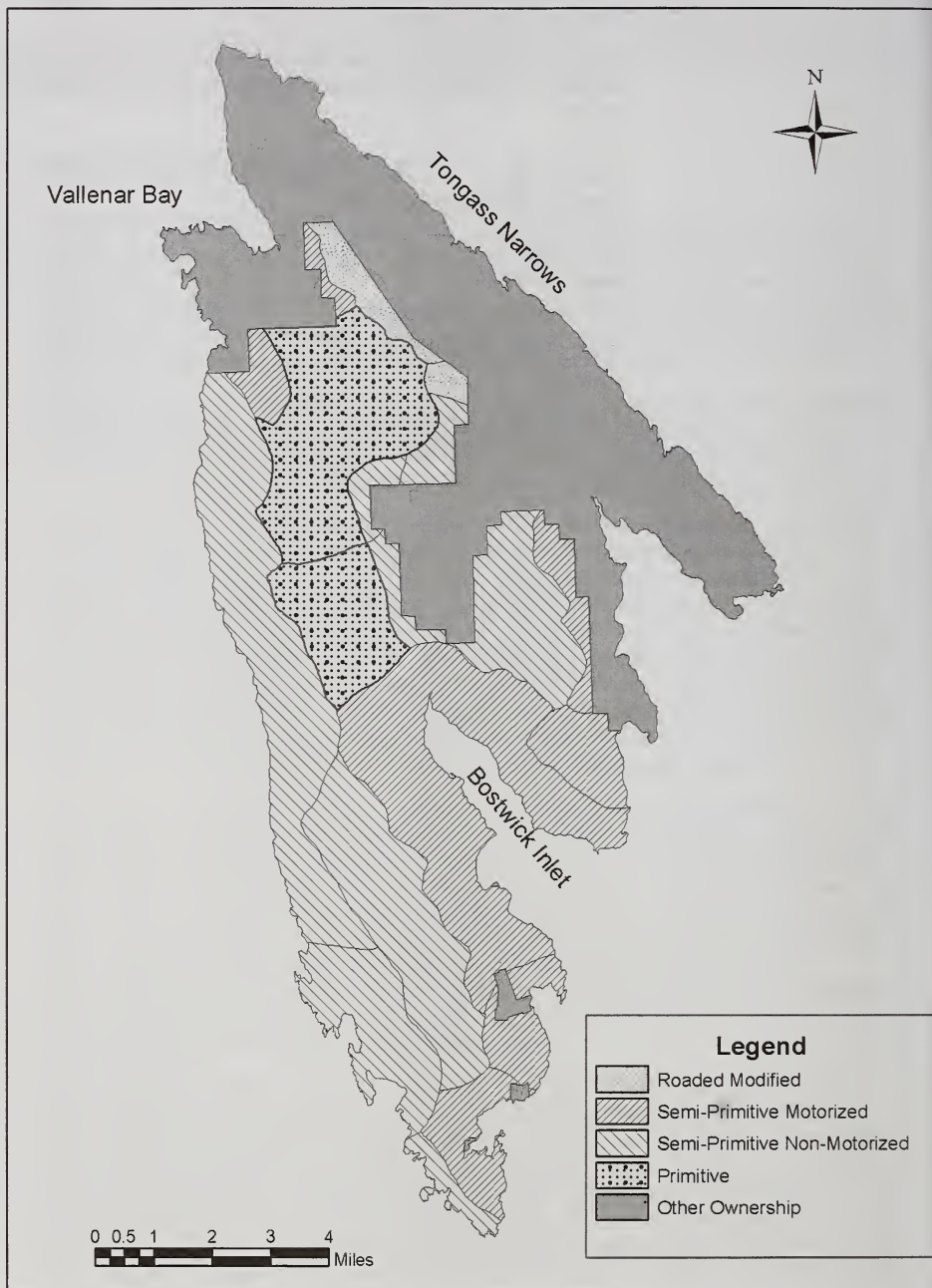
ROS Class	Acres	Percent of Project Area
Roaded Modified	784	1%
Semi-Primitive Motorized	12,988	21%
Semi-Primitive Non-Motorized	17,856	29%
Primitive	7,765	13%
Private (Non-NFS Lands)	22,011	36%

Source: GIS, D. Benson 2003



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Figure 3-6  
Gravina Existing ROS Acres



Source: GIS, D. Benson 2003

## Recreation Places and Sites

The types of activities that occur in the project area can be grouped into general categories based on the physical setting required for the activity - marine and land-based. Figure 3-7 shows the Recreation Places and Sites on Gravina Island.

### Marine-based

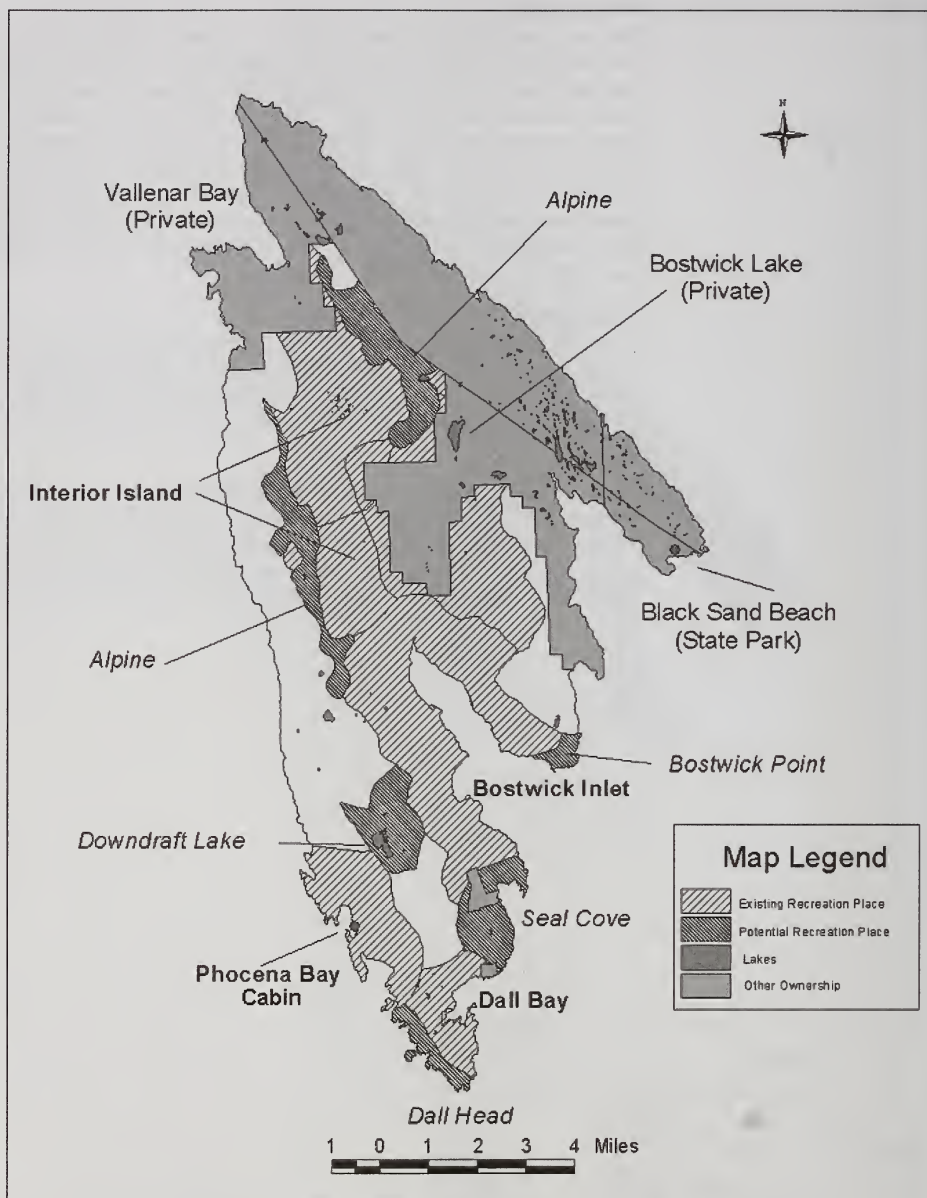
The most popular marine-based activities are beachcombing and hiking, fishing, motor boating, clamming, and crabbing. Other popular activities are hunting and kayaking/canoeing. Wildlife viewing is increasing in popularity. The marine-based recreation places are extensive and readily accessible, and the opportunities and activities are dispersed and widespread along the protected coves and islands adjacent to Gravina Island. The proximity of the island to the town of Ketchikan makes it ideal for day trips for residents and tourists alike. Access is by private or charter boat or floatplane, or by using the airport ferry. State, Borough, and private lands are prominent on the island. Agreements and partnerships will be important in the development of any future facilities. The Phocena Bay mooring buoy is the only Forest Service developed marine site on Gravina Island.

### Land-based

These areas are used for hunting, fishing, and/or wildlife viewing. Currently there is no roaded access on the island, and overland hiking is the predominant mode of travel after visitors arrive on the island either by boat or plane. The Phocena Bay cabin is the only Forest Service developed land-based site on Gravina Island. This Forest Service rental cabin is accessed by floatplane or boat.

The Alaska State Park System currently operates one day-use area on Gravina Island. This site is Black Sands Beach State Park located within Blank Inlet, which is accessible by boat. Alaska State Parks has shown an interest in developing a marine park within Dall Bay near the southern tip of Gravina Island. This proposal has been identified in Alaska Statute 41.21.304 (18). The State desires to develop this area, but there are no immediate plans to do so.

Figure 3-7  
Gravina Island Recreation Places and Sites



**Existing Recreation Places** (shown for NFS land only) – Areas where activities are currently occurring. These are mostly undeveloped and used for hiking, hunting, fishing, and/or dispersed camping.

**Potential Recreation Places** (shown for NFS land only) – Areas that have the potential to become a recreation place requiring development of trails or other facilities. These were identified based on current use patterns around the Ketchikan Ranger District. Locals enjoy recreating along the shoreline or in alpine areas with views or destinations.

Source: GIS, D. Benson, 2003



## Recreation Activities and Use Patterns

The Ketchikan area has user demand for both roaded and non-roaded recreation. Forest-wide, roaded recreation opportunities (places and sites) are inadequate to meet existing and projected future demand (through 2010). Although the user demand for non-roaded recreation is anticipated to increase, non-roaded recreation opportunities (places and sites) exceed existing demand levels and are forecast to exceed demand until at least 2010 (Forest Plan SEIS 2003, p. 238-247).

Inland areas on Gravina Island currently offer a primitive (non-motorized) recreation experience - one where the sights of human influence are rare. The opportunity exists for residents of Ketchikan to hike and hunt along non-developed trail routes originating from the airport or anywhere along the shoreline. There are no realistic ways to accurately describe the numbers of people who recreate on Gravina Island because of the lack of development. However, the Alaska Department of Fish and Game estimated 823 hunting days on Gravina Island in 2001 with approximately 243 hunters participating that year (ADFG 2001 Deer Hunter Survey Summary Statistics, Gravina WAA 0101), and annually the Phocena Bay cabin receives an average of 40 paid nights per year for a total of 75 users. (These use numbers do not reflect day use that occurs at the Phocena Bay cabin site or mooring buoy.) A large number of the public comments received on the Gravina Draft EIS favored maintaining Gravina Island's predominantly non-roaded condition.

Current motorized opportunities for inland recreation on Gravina Island are non-existent, since there are no existing roads on National Forest System lands. Roaded recreation opportunities are limited for the people living in the Ketchikan area. There are approximately 30 total miles of road open for roaded recreation on Revillagigedo Island, and the Forest Service manages only small portions of these lands. Most of the National Forest System lands are only accessible by boat or float plane. During early public scoping for this project, the majority of commenters favored the construction of roads on the island to provide additional opportunities for motorized recreation.

Marine-based recreation activities are located along the coves and inlets on the south end of the island, including Blank Inlet, Seal Cove, Bostwick Inlet, Dall Head, and Phocena Bay, and in a few places to the north at Grant Cove, Vallenar Point, and Vallenar Bay. The east coast of the island is a mixture of private, State, and Borough property and the Ketchikan International Airport. The area receives quite a bit of air and sea traffic. The west-facing coast, from Phocena Bay north to Grant Cove, is mostly unusable for marine-based recreation activities due to strong currents, steep, rocky banks, and heavy timber growing near the high tide line. The north end of the island is mostly private and State-owned land that has had portions logged in the past.

Two developed sites, Phocena Bay and Black Sands State Beach, have facilities frequently used for motorized marine recreation.

Non-motorized marine-based activities occur in dispersed campsites along the shores of Bostwick Inlet, Phocena Bay, Seal Cove, Dall Head, Blank Inlet, and the offshore islands. The camps are used for casual day-use, point-to-point paddling or sailing, and subsistence hunting, fishing, and gathering. Fire rings, simple paths, and areas cleared for camping are prominent markers in these locations. There are no developed camps under permit on National Forest System lands within the project boundary.

### Commercial Outfitters and Special Recreational Use Permits

Three Outfitter and Guides are currently permitted to operate within the project area for a total of 30 service days per year. The Outfitter and Guides are authorized to use portions of Bostwick Creek for freshwater fishing only. Other commercial trips may incidentally use the area on a pass-through basis. Commercial floatplanes and charter boats are used to shuttle customers to Phocena Bay cabin, while commercial and charter boats use the waters in and around Gravina Island for fishing and shellfish gathering.

## Environmental Consequences

### Direct and Indirect Effects

The following section describes the effects that the six alternatives could have on the recreation opportunities within the project area. This analysis is based on the direct and indirect effects on the recreation setting and not on current or future use numbers. The effects to each individual ROS by alternative are summarized in Table 3-30.

Table 3-30  
Gravina ROS Acres by Alternative

ROS Class	Existing Condition		Percent Change by Alternative					
	Acres	Percent	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
Roaded Modified	784	1	0	+18.5	+15.8	+16.6	0	+15.8
Semi-Primitive Motorized	12,988	21	0	+1.0	+3.6	+2.9	0	+3.6
Semi-Primitive Non-Motorized	17,856	29	0	-6.8	-6.8	-6.8	0	-6.8
Primitive	7,765	13	0	-12.7	-12.7	-12.7	0	-12.7
Private (Non-NFS Lands)	22,011	36	0					

Source: GIS, D. Benson 2003

### Alternative 1

Implementation of the No-action Alternative would leave the National Forest System lands on Gravina Island in a condition similar to what they are today.

#### ROS Classification

This would remain the same as outlined in the Existing Condition (Table 3-30). Visitors to Gravina Island would experience a wide variety of recreation opportunities across the island. Motorized opportunities would occur along the shoreline areas, where the sights and sounds of boat traffic are likely to continue. The interior of the island would remain primitive in nature due to the lack of roads on lands managed by the Tongass National Forest.

#### Recreation Places and Sites

The existing condition would be maintained, at least on National Forest System lands. Recreation places on Gravina Island are mostly undeveloped, and the level of development would not change under current management practices. The State of Alaska Parks and Recreation Department may choose to further develop Black Sand Beach or Dall Bay marine park. This would not change the character of available activities occurring in recreation places on lands managed by the Forest Service.

If the No-action Alternative were selected at this time, the existing recreation facilities would remain in their current state. The Phocena Bay cabin would continue to receive use at its present rate and receive maintenance at the current frequency (on an as-needed basis or as funding allows). The State-maintained/owned marine park, day use areas, and moorage facilities would remain the same.

#### Recreation Activities and Use Patterns

The use of the island as a place where local residents go for day trips and boating excursions would continue. Marine-based recreation activities would not change. Dispersed or subsistence camps along the inlets and bays would continue. The opportunity to meet Forest Plan goals by working with local communities to coordinate recreation development would continue to go unmet. As a primitive upland opportunity for big game hunting, the interior of Gravina Island, especially the area around Bostwick Lake, would continue to receive some use by a few hunters who access the area either by foot after crossing the airport ferry, or by

personal boat. Recreation places and sites would remain as they are now. Permitted uses along Bostwick Creek would continue with no impacts.

## Alternative 2

In this alternative, an LTF would be constructed on the northeast side of the Bostwick Inlet, and a road system constructed from it to the interior of Gravina Island to access timber harvest units on National Forest System lands (see alternative map at end of Chapter 2). The road system would be closed and the LTF decommissioned upon completion of harvest activities. The harvest units and the residual transportation system would increase recreational access on the island, and would have direct effects on any dispersed recreation sites, while allowing for the potential development of these dispersed recreation opportunities to a more developed status.

### ROS Classification

The semi-primitive non-motorized areas along the western coast, where limited motorized boat traffic is the main influence, would not change over the long term. During logging operations, recreation traffic may be diverted temporarily for safety considerations.

The interior of the island on National Forest System lands would change during the course of road building, whether or not the roads were maintained post-harvest. The recreation opportunities would be altered by the presence of roads and by the appearance of managed (harvested) lands in the uplands. The primitive areas between Bostwick Inlet and Vallenar Bay, and the semi-primitive motorized area around Bostwick Inlet, would be most affected. These roads would be minimally constructed, would not be open for public travel during harvest, and would be closed to motorized traffic after harvest activities were complete. Roads may be available for hiking and biking, and potentially for Off Highway Vehicle (OHV) use. There is also a potential for winter recreation opportunities such as snowmobile and cross-country ski use, even if the road is closed. The total number of Roaded Modified acres and Semi-Primitive Motorized acres would increase, while Semi-Primitive Non-Motorized and Primitive acres would decrease (Table 3-30). The most substantial impact would be the reduction of the Primitive setting within the interior valley between Bostwick Inlet and Vallenar Bay. The setting and the recreational experience within these areas would gradually become a Roaded Natural condition as openings became revegetated and roads became overgrown.

The ROS settings around Phocena Bay, Dall Bay, and Seal Cove would not be impacted based on the proposed harvest systems, and absence of road building. Units in these areas would be helicopter logged with a goal of retaining approximately 50 percent trees standing. Effects to the scenery in the area are discussed in the Scenery section of this chapter.

### Recreation Places and Sites

Each of the recreation places would change to some degree, either by the addition of roads, or through the introduction of harvest areas where none had existed before. The proposed log transfer facility in Bostwick Inlet and associated road would become the primary point of access for people interested in recreation activities in the interior portions of the island. This may increase the number of boaters who use Bostwick Inlet, and the improved access would increase the number of people using the interior of the island for popular hunting and fishing areas.

The Phocena Bay cabin, currently a semi-primitive non-motorized recreation site, would be impacted by increased activities and the slightly visible views of harvest activities. There are several helicopter harvest units near the Phocena Bay cabin: Units 88, 89, 107, and 108 are within 1 mile, and Units 75, 80, and 81 are within 2 miles of this site. Logs harvested from these units would be flown to barge or log boom drops near Phocena Bay. The cabin would be unavailable during harvest operations, or harvest operations may be scheduled around the cabin use season (Memorial Day to Labor Day). During harvest, the use of barge sites would temporarily impact the type of water-based recreation activities taking place. Once harvest activities are completed, the logged areas would be slightly visible from the middle of Phocena



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Bay and from outside the bay. From the cabin site this harvest would not be visible. Those hiking through the forested slopes above the cabin would encounter evidence of harvest and small openings when passing through these treated areas. Residual slash from logging may make hiking in these areas more difficult. Further discussion on the effects to the scenery in the area is found in the Scenery section of this chapter.

Bostwick Inlet, currently very popular as a recreation destination with dispersed recreation sites, would be impacted by the development of a road system and the new LTF, and harvest of helicopter units along the inlet. Logs from isolated helicopter harvest units may be flown to a barge or log boom drops near the mouth of Bostwick Inlet. Once harvest activities were completed, the harvested areas would be noticeable from Bostwick Inlet. Longer-term effects to the scenery in the area are discussed in the Scenery section of this chapter.

The temporary harvest activities around Dall Bay associated with the proposed barge drop would indirectly impact the dispersed recreation activities around the area. Due to the short duration of the harvest activities, the impacts would be minimal. Black Sand Beach State Park would not be impacted by any activities associated with logging operations.

## Recreation Activities and Use Patterns

Use of inlets and bays for marine-based recreation (Phocena Bay, Nehenta Bay, Dall Bay, and Stomach Bay) may be displaced during harvest/log transfer activities due to safety concerns and noise. Those decreases would not be permanent, and by restricting logging activities in this area between Memorial Day weekend and Labor Day weekend, the associated impacts would be minimized. In the long-term, use may increase within Bostwick Inlet to access the interior of the island via the newly constructed road system.

With the improved access, use would likely increase in the interior of the island. The type of use received would change based on the existence of roads, which may be used for hiking, hunting, fishing, OHV use, and easier access to potential winter recreation areas. The current use is largely unknown, and increases would not be encouraged by the nature and duration of the harvest activities, but any kind of clearing and construction would permit easier access than the current "system" of game trails and random openings. The means of closure (gates, closure order, etc.), and the long-term ability to enforce the closures, would most likely require additional law enforcement presence.

Current Outfitter and Guide permittees using Bostwick Creek would be displaced in the short term, but the increased access may lead to more permit requests in this area for a larger range of opportunities such as fishing, hunting, hiking, and potential wildlife viewing.

## Alternatives 3 and 6

In these alternatives, a road system would be constructed from the Pacific Log and Lumber LTF to the interior of Gravina Island to access timber harvest units on National Forest System lands (see alternative map at end of Chapter 2); the road system would be closed upon completion of harvest activities. The harvest units and the residual transportation system would increase recreational access on the island, and would have direct effects on any dispersed recreation sites, while allowing for the potential development of these dispersed recreation opportunities to a more-developed status.

## ROS Classification

There are only subtle changes to the settings between this alternative and Alternative 2. Similar to Alternative 2, there would be an increase in the total number of Roaded Modified acres and Semi-Primitive Motorized acres, while Semi-Primitive Non-Motorized and Primitive acres would decrease (Table 3-30). The most substantial impacts would be the reduction of the Primitive setting within the interior valley between Bostwick Inlet and Vallenar Bay. The setting and the recreational experience would gradually become a Roaded Natural condition as openings became revegetated and roads became overgrown.

## Recreation Places and Sites

Each of the recreation places would change to some degree, either by the addition of roads or through the introduction of harvest areas where none had existed before. Rather than a log transfer facility in Bostwick Inlet (proposed in Alternative 2), a permanent road link would be constructed from the east side of Gravina Island, but would be closed to vehicle use after harvest. The closed road system would provide a primary point of access for people interested in recreation activities in the interior of the island. This road system could be converted into and managed as a trail system in the future after further study.

Impacts to recreation sites near log drop locations (Phocena Bay, Dall Bay, and Black Sand Beach State Park) would be similar to those described for Alternative 2. The Phocena Bay cabin, currently a semi-primitive non-motorized recreation site, would be impacted by helicopter harvest of units near the cabin: Units 88, 89, 90, and 91 are within 1 mile, and Units 75, 80, 81, 92, and 93 are within 2 miles of this site.

Bostwick Inlet, currently very popular as a recreation destination with dispersed recreation sites, would be impacted by increased activities and the views of harvest activities. Logs from helicopter harvest units along Bostwick Inlet would be flown to a barge or log boom drops within the inlet. Once harvest activities were completed, the harvested areas would be noticeable from Bostwick Inlet. Effects to the scenery in the area are discussed in the Scenery section of this chapter.

## Recreation Activities and Use Patterns

Use of inlets and bays for marine-based recreation (Phocena Bay, Nehenta Bay, Dall Bay, and Stomach Bay) may be displaced during harvest/log transfer activities due to safety concerns and noise. Those decreases would not be permanent, and by restricting logging activities in this area between Memorial Day weekend and Labor Day weekend, the associated impacts would be minimized.

With the improved access, use would likely increase in the interior of the island. The type of use received would change based on the existence of roads, which may be used for hiking, hunting, fishing, OHV use, and easier access to potential winter recreation areas. The current use is largely unknown, and increases would not be encouraged by the nature and duration of the harvest activities, but any kind of clearing and construction would permit easier access than the current "system" of game trails and random openings. The means of closure (gates, closure order, etc.), and the long-term ability to enforce the closures, would most likely require additional law enforcement presence.

Impacts to the current Outfitter and Guide permittees using Bostwick Creek would be minimal and would only occur during harvest activity. The long-term effects to these users would be minimal with the closure of the road system. The current users of Bostwick Creek would still access this area via Bostwick Inlet since the road system would be closed post-harvest. On the other hand, the addition of the closed road system may lead to additional opportunities for other permittees to develop a larger range of activities, such as hunting, hiking, and viewing scenery.

In this alternative, a road system would be constructed from the Pacific Log and Lumber Company LTF to the interior of Gravina Island to access timber harvest units on National Forest System lands (see alternative map at end of Chapter 2), and the road system would be maintained as open for recreation use post-harvest. The harvest units and the residual transportation system would increase recreational access on the island, and would have direct effects on any dispersed recreation sites, while allowing for the potential development of these dispersed recreation opportunities to a more-developed status.

## ROS Classification

This alternative leaves the road system open for general use. There would be substantial changes to the setting with the inclusion of increased access to the public. Under this alternative the Semi-Primitive Non-Motorized and Primitive settings would change to a Roaded Modified setting. This takes into affect the increased number of people using the road system

## Alternative 4

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to recreate. The total number of Roaded Modified acres and Semi-Primitive Motorized acres would increase, while Semi-Primitive Non-Motorized and Primitive acres would decrease (Table 3-30). Similar to Alternatives 2, 3, and 6, the most substantial impacts would be the reduction of the Primitive setting within the interior valley between Bostwick Inlet and Vallenar Bay.

#### Recreation Places and Sites

The interior recreation places on Gravina Island would be accessible by individuals who want to drive for recreation. Driving for recreation is an untapped recreation resource in most of Southeast Alaska (aside from Prince of Wales Island). The demand for facilities to accommodate sanitation and safety concerns could increase in the interior, currently unroaded recreation places of the island. The marine-based recreation activities would not change based on the harvest or road building.

Impacts to recreation sites near log drop locations (Phocena Bay, Dall Bay, and Black Sand Beach State Park) would be similar to those described for Alternative 2. The Phocena Bay cabin, currently a semi-primitive non-motorized recreation site, would be impacted by helicopter harvest of units near the cabin: Units 88, 89, 90, 91, 107, and 108 are within 1 mile, and Units 75, 80, 81, 92, and 93 are within 2 miles of this site.

Bostwick Inlet, currently very popular as a recreation destination with dispersed recreation sites, would be impacted by increased activities and the views of harvest activities. Logs from helicopter harvest units along Bostwick Inlet would be flown to a barge or log boom drops within the inlet. Once harvest activities were completed, the harvested areas would be noticeable from Bostwick Inlet. Effects to the scenery in the area are discussed in the Scenery section of this chapter.

Grant Cove has been identified as a potential helicopter log drop for trees harvested from Units 7 and 14. The temporary harvest activities associated with the proposed barge drop would indirectly impact recreation activities taking place around these non-National Forest System lands. Due to the short duration of the harvest, activities the impacts would be minimal.

With the addition of an open road system, the interior of Gravina Island would have potential for new and different types of recreation opportunities. There would be opportunities to access the alpine ridge along the west side of the island and the alpine ridge above the airport. Several trailheads and trails could be developed to access alpine areas, streams, and Bostwick Inlet. There may also be some winter recreation opportunities above 1,000 feet elevation. A few areas have the potential to be considered for cabins and/or campgrounds. Based on current funding, the Forest Service would probably use cooperators or partnerships to develop recreation facilities on Gravina Island.

Recreation places and sites would be modified from the non-Forest System Lands on the east side of the island, throughout the interior of the island, and to Bostwick Inlet. Under this alternative, the road system would remain open. The traditional methods of accessing the interior portions of the island would become obsolete, and conflicts between traditional users and the new users may occur.

#### Recreation Activities and Use Patterns

Use of inlets and bays for marine-based recreation (Phocena Bay, Nehenta Bay, Dall Bay, and Stomach Bay) may be displaced during harvest/log transfer activities due to safety concerns and noise. Those decreases would not be permanent, and by restricting logging activities in this area between Memorial Day weekend and Labor Day weekend, the associated impacts would be minimized.

With the improved access, use would increase in the interior of the island. The types of use would change based on the existence of roads, which would be used for driving for pleasure, hunting, fishing, OHV use, access to potential recreation trails and facilities, and easier access to potential winter recreation areas. The road system would allow users of all skill levels the



opportunity to access the interior of the island. It would not be limited to the few who formerly used the area for hunting or fishing. There would be a substantial increase in the number of people using this area for a variety of recreation opportunities.

Current Outfitter and Guide permittees using Bostwick Creek could either be displaced by the increased activity or could use the road system as an easier means to access the area. With improved access to the area, there could be an increase in the number of Outfitter and Guides interested in using the area for fishing, hunting and hiking.

## Alternative 5

In this alternative, all timber units would be harvested via helicopter, and no new roads would be built (see alternative map at end of Chapter 2). The harvest units would have minimal impacts on existing recreation opportunities on the island and other dispersed and developed recreation sites.

### ROS Classification

The current classifications would not change as a result of the specific prescriptions for the helicopter units.

### Recreation Places and Sites

The land-based recreation places and sites would not change as a result of timber harvest, but the appearance of managed lands from the shore could change.

Impacts to recreation sites near log drop locations (Phocena Bay, Dall Bay, and Black Sand Beach State Park) would be similar to those described for Alternative 2. The Phocena Bay cabin, currently a semi-primitive non-motorized recreation site, would be impacted by helicopter harvest of units near the cabin: Units 88, 89, 90, 91, 107, and 108 are within 1 mile, and Units 75, 80, 81, 92, and 93 are within 2 miles of this site.

Bostwick Inlet, currently very popular as a recreation destination with dispersed recreation sites, would be impacted by increased activities and the views of harvest activities. There are several helicopter harvest units along the northeast side of Bostwick Inlet. Logs harvested from these units would be flown to a barge or log boom drops within Bostwick Inlet. Once harvest activities were completed, the harvested areas would be noticeable from Bostwick Inlet. Effects to the scenery in the area are discussed in the Scenery section of this chapter.

### Recreation Activities and Use Patterns

Use of inlets and bays for marine-based recreation may decrease during harvest/log transfer activities due to safety concerns and noise. Effects on use of the Phocena Bay cabin area would be similar to Alternatives 2 and 3. Other recreational users and Outfitter and Guides may be displaced from around harvest areas during operations, but those decreases would not be permanent and would return to the current use levels after harvest is completed.

## Cumulative Effects

The following section describes the effects that the six alternatives combined with reasonably foreseeable future actions on other ownerships could have on the recreation opportunities within the project area. The possible future actions of other landowners and agencies to develop land on Gravina Island include: construction of a bridge from Ketchikan and additional development on the Tongass Narrows side of Gravina Island, timber sales on State of Alaska lands at the head of Bostwick Creek, residential development near Vallenar Bay (on Ketchikan Gateway Borough lands), and development of Dall Bay State Park.

Under all alternatives, there would be no cumulative effects to Black Sand Beach or Phocena Bay cabin from activities by other landowners or agencies.

## Alternatives 1 and 5

### ROS Classification

No roads would be constructed on National Forest System lands in Alternatives 1 (No Action) or 5 (helicopter harvest only). Any cumulative changes to the ROS classification under Alternatives 1 or 5 would come through the development of lands bordering National Forest System lands. Current plans by the State Department of Natural Resources, in cooperation with the Ketchikan Gateway Borough, to construct a bridge to Gravina Island, the development

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of access to Bostwick Lake, and potential timber harvest areas near the interior of the island have the potential to effect the ROS classification on Forest System Lands.

The interior of the island would change during the course of road building, regardless of whether or not the roads were maintained post harvest. The recreation opportunities would be altered by the presence of roads and by the appearance of managed (harvested) lands in the uplands. The Primitive areas between Bostwick Inlet and Vallenar Bay would be most affected by these activities. The most substantial impact would be the reduction of the Primitive setting within the interior valley. The setting and the recreational experience within these areas would change to a Roaded Modified setting and gradually become Roaded Natural as openings became revegetated and roads became overgrown.

The future development of private lands around Vallenar Bay and the development of Dall Bay into a State Park would not effect the ROS classification on Forest System lands.

## **Recreation Places and Sites**

The further development of two currently popular recreation places near National Forest System lands may lead to other recreation opportunities in the future. The development of Dall Bay into a State Park has the potential for making this area into a more-developed recreation destination. This would not have direct impacts on Forest System lands, but with more people recreating in the area there may be a demand for the development of recreation sites in and around Dall Bay.

With the development of a bridge to Gravina Island, and a road providing access to Bostwick Lake and the interior harvest areas, we anticipate an increased demand for the development of recreation opportunities along Bostwick Creek. This type of development would depend on other factors that have not been determined, like road location and public access to the road.

## **Recreation Activities and Use Patterns**

Construction of a bridge from Ketchikan to Gravina Island and development of a road system to access timber harvest areas on State lands would attract more people, and likely generate additional use of NFS lands. We can anticipate an increase in hunting in the area, and fishing along Bostwick Creek. This may increase the demand for Outfitter and Guiding in places that have typically been difficult to access.

The increased development of residential lots around Vallenar Bay would increase the number of people using the area and may generate some additional use of the upper Vallenar Creek drainage. We do not anticipate this use to be substantial.

The further development of the Dall Bay area may lead to increased use in and around the south end of the island where people may disperse to using NFS lands for other recreation activities.

## **Alternatives 2, 3, 4, and 6**

### **ROS Classification**

The development of private land along the Tongass Narrows, in Vallenar Bay, and the harvest of University of Alaska and Alaska Mental Health lands on the northeastern slopes of the island would likely change the recreation settings on adjacent National Forest System lands beyond the changes created by the construction of roads and the harvest proposed in Alternatives 2, 3, 4 and 6. Development of State of Alaska lands near the head of Bostwick Creek would require the State to construct a connecting road from the Tongass Narrows under Alternative 2. Under Alternatives 3, 4, and 6 the State would need to construct connecting roads from the National Forest System road planned under these alternatives. This development, under any of the alternatives, would probably add some Roaded Modified acres through the center of the Bostwick Valley adjacent to the State of Alaska/National Forest System boundary.

### **Recreation Places and Sites**

With the development proposed in any of these four alternatives, the improved access may lead to the demand for further development of recreation facilities such as a mooring buoy and

developed/dispersed campsites. There are no plans for this type of development at this time, but with increased use would come proposals for this type of development.

The further development of two currently popular recreation places near National Forest System lands may lead to other recreation opportunities in the future. The development of Dall Bay into a State Park has the potential for making this area into a more-developed recreation destination. This would not have direct impacts on NFS lands, but with more people recreating in the area there may be a demand for the development of recreation sites in and around Dall Bay.

With the development of a bridge to Gravina Island, a road providing access to Bostwick Lake and the interior harvest areas, we anticipate an increased demand for the development of recreation opportunities along Bostwick Creek. This type of development would depend on other factors that have not been determined, like road location and public access to the road.

## **Recreation Activities and Use Patterns**

These alternatives would cause the greatest cumulative impacts to the existing recreation use patterns on Gravina Island, while providing the greatest potential to develop the area to accommodate additional and more developed types of recreation opportunities.

**Alternative 2:** Although no road would be built connecting the road system in the interior to the Tongass Narrows side of Gravina, the building of a bridge to Gravina and the development of more private land along the Narrows would increase the numbers of hikers and hunters making their way across the muskegs over undeveloped trails to Bostwick Lake. Just beyond Bostwick Lake, hikers could reach the logging road system proposed for this alternative. Even without a direct road link to Tongass Narrows, this road system would enhance hiking access, and would attract more people into the interior of the island than presently use the area. This increased use of the interior would increase the chance that a hiker or hunter would encounter other users, thereby reducing their sense of remoteness and solitude.

**Alternatives 3, 4, and 6:** Development of State lands in the interior of Gravina Island would not significantly add to the impacts on recreational activities and use patterns created by the National Forest System road and harvest.

The increased development of residential lots around Vallenar Bay would increase the number of people using the area and may generate some additional use of the upper Vallenar Creek drainage. We do not anticipate this use to be substantial.

The further development of the Dall Bay area may lead to increased use in and around the south end of the island, where people may disperse to National Forest System lands for other recreation activities.



## Roadless Area

### Introduction

Roadless areas are National Forest System lands identified as undeveloped, where there are no improved roads maintained for travel by motorized vehicles (intended for highway use) and no extensive timber harvest or other developments. Roadless areas were originally identified during the Forest Service's Roadless Area Review and Evaluation studies (RARE and RARE II) done in the 1970s. These studies identified areas that would meet the minimum criteria for inclusion in the National Wilderness Preservation System, including an area typically exceeding 5,000 acres. Due to ongoing activities adjacent to the area and their influences on solitude and primitive recreation opportunities, the Gravina roadless area was rated 21 out of a possible 28 points under the Wilderness Attribute Rating System (WARS), developed in 1977 by the Forest Service and used to inventory the wilderness characteristics of roadless areas during the RARE II process. The Gravina roadless area ranked 47<sup>th</sup> from the highest (along with 5 other roadless areas) among the 109 Tongass inventoried roadless areas (SEIS, Appendix C2, page 490).

The Roadless Area Conservation Rule (January 12, 2001) generally prohibited timber harvest and road construction in inventoried roadless areas. More information on the background of roadless areas is available in the Gravina project record. On December 30, 2003 after analysis of current conditions in Southeast Alaska and public comment on the proposal, the Department amended the roadless rule so that the Tongass National Forest is not subject to the prohibitions (against commercial harvest and roadbuilding) in the roadless rule. The Gravina Island Timber Sale project falls within the Gravina Roadless Area #522.

The Forest Plan SEIS evaluated roadless areas within the Tongass National Forest for recommendations as potential wilderness. In the SEIS Record of Decision, the No-action Alternative was selected, in which no additional wildernesses were recommended and the existing land use designations (LUDs) were maintained. The Gravina Island roadless area was allocated to Timber Production, Scenic Viewshed, and Old-growth Habitat LUDs in the 1997 Forest Plan. Another land use designation, Semi-remote Recreation, is allocated to small islands adjacent to Gravina Island. An additional LUD, Minerals, overlays portions of the Scenic Viewshed and Old-growth Habitat LUDs. See Table 3-31 in this section.

### Gravina Island Final EIS Roadless Analysis

The roadless area analysis used in this EIS is based on the most recent roadless inventory that was prepared for the Forest Plan Final Supplemental Environmental Impact Statement (SEIS, February 2003). The 2003 roadless inventory updated the information used in the 1997 Forest Plan with the most current land ownership information, new developments (roads, timber harvests, power lines, etc.) implemented since the previous inventory, and used a consistent mapping process to represent unroaded areas across the Forest.

## Affected Environment

### Gravina Roadless Area 522

The Gravina Island Timber Sale project encompasses the majority of the Gravina Roadless Area #522 (Figure 3-8). The following description is summarized from the Forest Plan SEIS, Appendix C2-482 to C2-491.

The Gravina roadless area is 38,978 National Forest System acres in size, located along the western side of Gravina Island, and makes up 64 percent of the island. The Gravina Island project area encompasses approximately 38,662 acres of the roadless area. (The remaining acreage is in smaller outlying islands that were excluded from the original project area boundary.) The remaining ownership on the island is split between other agencies and private lands (Figure 1-1), with the north end of the island reserved for development of the city of

Ketchikan. State of Alaska Department of Natural Resources, State of Alaska University Trust, and Alaska Mental Health Trust lands could be described as having roadless characteristics at this time. Ketchikan Gateway Borough lands can be similarly described except for industrial development at the airport and the Pacific Log and Lumber mill site (Figure 1-1). State land selections extend into the area, causing an irregular boundary. Lands identified for potential Native selections, occurring around Bostwick Inlet, would add to the irregular boundary.

The island is characterized by low-elevation topography, a rugged backbone ridge, and muskeg flats. The maximum elevation is 2,700 feet. There are 78 miles of shoreline on saltwater and an undetermined acreage of small islands. The island may be accessed by boat or floatplane, or by taking the airport ferry from Ketchikan.

The roadless area was allocated to five different land use designations (LUDs) in the Forest Plan SEIS (Table 3-31). The Semi-remote Recreation LUD is comprised of small islands adjacent to Gravina Island that are part of the roadless area. Two of the LUDs (Timber Production and Scenic Viewshed) allow timber harvest and associated road construction. The Forest Plan (Appendix C) described the available harvest area as about 14,203 acres of land tentatively suitable for timber harvest activities, but the Gravina Island project analysis refined this to approximately 6,802 acres of suitable and available land. (For a detailed analysis of forest land classification acres, refer to Table 3-1 in Chapter 3 of this Final EIS.)

Table 3-31 displays the acreage of the land use designations in Gravina Roadless Area #522, as shown in the Forest Plan SEIS.

**Table 3-31**  
**Gravina Roadless Area 522 – Land Use Designations**

Land Use Designation	Acres
Timber Production – Allows road construction and timber harvest.	17,262
Old-growth Habitat – Protection from harvesting.	14,210
Scenic Viewshed – Limited harvest with specific guidelines.	7,329
Semi-remote Recreation <sup>1</sup> – Protection from harvesting <sup>1</sup>	177
Minerals <sup>2</sup>	4,329

<sup>1</sup> Smaller islands associated with the roadless area are allocated to Semi-remote Recreation and Scenic Viewshed LUDs.

<sup>2</sup> Acres in the Minerals LUD are included in the Scenic Viewshed and Old-growth LUD acres.

Source: Forest Plan SEIS, 2003

Lands allocated to the Old-growth Habitat LUD are located mostly west of Dall Ridge. The south end of the area, in the vicinity of Dall Head and Nehenta Bay, was allocated to the Minerals LUD, which is a secondary designation that overlays one or more primary LUD designations. Smaller islands, accounting for less than 1 percent of the roadless area, are allocated to the Semi-remote Recreation and Scenic Viewshed LUDs.

The following section summarizes characteristics of the Gravina Island Roadless Area #522 from Appendix C of the Final SEIS (pages C2-482 to 491). These characteristics are discussed in greater detail in other, resource-specific sections of this chapter.

**Proximity to other roadless areas:** The North Revilla (526) Roadless Area is approximately 4 miles to the northeast; the Revilla Roadless Area (524) is approximately 5 miles to the east; and the McKenzie Roadless Area (519) is approximately 6 miles west across Clarence Strait.

**Soil, water, and air:** Air quality is excellent. The soils in the Gravina Roadless area are typical of those found throughout Southeast Alaska. The roadless area contains small amounts of karst, most of which would be classified as low vulnerability.

## Characteristics of the Gravina Island Roadless Area

### 3 Environment and Effects

The Gravina roadless area contains 11 watersheds. Water quality is good and supports a number of resident and anadromous fish species. There are no municipal watersheds on Gravina Island. The Ketchikan International Airport and Pacific Log and Lumber are the main industrial developments on Gravina Island. The Ketchikan International Airport obtains drinking water from the City of Ketchikan via a pipeline from Revillagigedo Island. Pacific Log and Lumber obtains drinking water from a rainwater catchment system, as do many other private residences. For additional information, see the Soils, Geology, Watershed and Fisheries sections of this chapter.

**Species diversity:** Currently, the National Forest System land on Gravina Island is unroaded and no invasive plants have been found on the island. The project area contains many species of plants and animals typically found in the Tongass National Forest. The Queen Charlotte goshawk, trumpeter swan, and loose-flowered bluegrass are sensitive species known to be within or use the project area. Pink, chum, and coho salmon, in addition to steelhead, Dolly Varden, and cutthroat trout, are fish species that use the stream habitats within the project area. See the Watershed, Fisheries, TES, and Biodiversity and Old Growth sections of this chapter and the biological evaluation (project file) for additional information.

**Habitat for threatened, endangered, proposed, candidate, and sensitive species and for those species dependent on large, undisturbed areas of land:** Roadless areas function as biological strongholds and refuges for many species. No threatened or endangered species occur within the project area; however, the humpback whale and Stellar sea lion occur in the marine waters adjacent to the project area. Sensitive and rare plants and animal species do occur within the project area. Those species populations would be protected as per Forest Plan Standards and Guidelines or through avoidance. See the Threatened, Endangered, and Sensitive Species section of this chapter for a discussion of these species in the project area and the biological evaluation (project file).

**Recreation value:** Gravina Island is used for hunting, fishing, wildlife viewing, hiking, and camping. Most of the camping occurs at dispersed sites and the Phocena Bay cabin. For additional information see the Recreation section in this chapter.

**Reference landscapes:** Gravina Island contains a 14,210-acre (Forest Plan SEIS, 2003) Old-growth Habitat LUD (Medium Old-growth Reserve), which is a non-development LUD. Gravina Island also contains three small Old-growth Reserves. Refer to Figure 3-15, Tables 3-31 and 3-47, and the Biodiversity section in this chapter.

**Natural appearance:** Gravina Island is seen primarily from the water and the adjacent communities of Ketchikan, Saxman and Metlakatla. Most of Gravina Island has a natural, unmanaged appearance. A few selected locations on the private lands on the east side of the island no longer possess this characteristic due to development.

**Traditional cultural properties and sacred sites:** Heritage resource surveys have identified specific site locations, which are protected throughout project planning and implementation by appropriate provisions in the National Historic Preservation Act (NHPA), Archaeological Resources Protection Act (ARPA), Native American Graves Protection and Repatriation Act (NAGPRA), Executive Order 13007, as well as Forest Plan Standards and Guidelines. Refer to the Heritage Resources section in this chapter for more detailed information. Bostwick Inlet is also of very high importance for in terms of subsistence, traditional and cultural uses. Further discussion on Subsistence, Wildlife, and Environmental Justice can be found in these sections of this chapter.

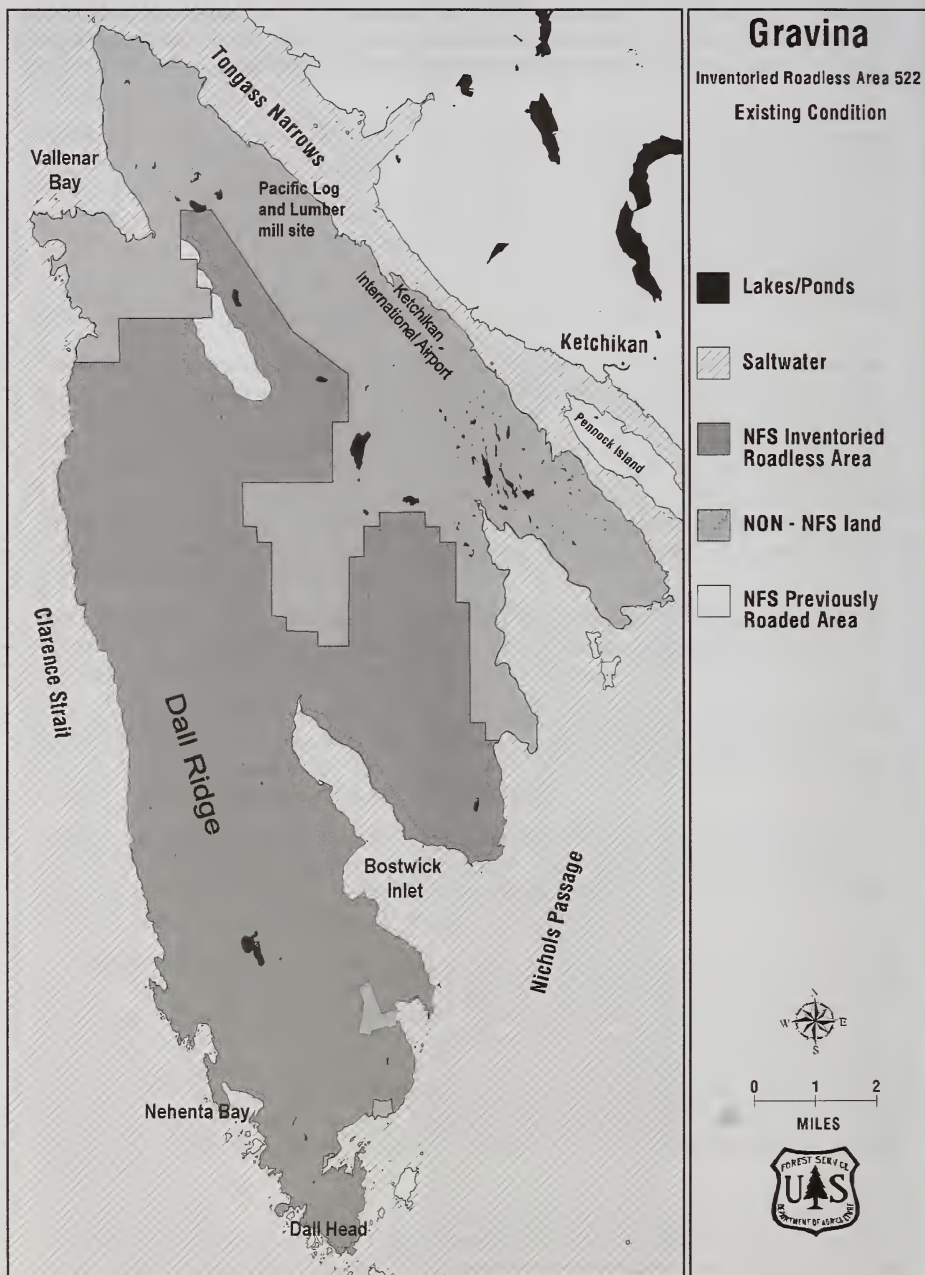
**Human disturbance:** Along the Gravina Island coastlines, there are nearly constant sights and sounds of sports and commercial fishing, recreational boating, and other commercial marine traffic, although this is reduced in the winter months. Within the area, jets and floatplanes can be seen and heard overhead, although people are not likely to be encountered in the interior of the island. The Ketchikan International Airport and the Pacific Log and Lumber Mill site are located on nearby Borough and private land on the east side of the island. Private landowners



have built homes along the east shore of Gravina Island and in Vallenar Bay. The interior of the island offers the opportunity for solitude from direct contact from other users and is primitive in nature.

**Other locally identified unique characteristics:** There are no unique or unusual land features or resources on Gravina Island. There are important resources that are listed above, but none that would be classified as unique to this part of Southeast Alaska.

Figure 3-8  
Gravina Inventoried Roadless Area #522



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Source: GIS, C. Rose, 2003

## Environmental Consequences

This section displays the potential effects of the Proposed Action, and future actions on other ownerships, on the roadless character of Gravina Roadless Area #522. This analysis has been refined since the release of the Gravina Island Timber Sale Draft EIS (2001), by using the more conservative mapping criteria developed for the Forest Plan SEIS (2003). To evaluate the effects of proposed harvest activities on the Gravina roadless area, we considered all areas within 1,200 feet of a proposed road, and within 600 feet of a proposed unit to be harvested from a road (using conventional equipment), as “roaded.” Helicopter-harvested units in proximity to roads (or roaded units) were also considered “roaded.” Helicopter units not near any new road construction (primarily in the western and southern majority of the island) were considered “unroaded” in our analysis. (This approach is consistent with the Forest Plan SEIS criteria.)

### Wilderness Potential

None of the Gravina Island Final EIS action alternatives would make the inventoried roadless area ineligible for future wilderness designation, although the roadless area may be smaller, as described under “Direct and Indirect Effects” in this section. At least 75 percent of the existing Gravina roadless area would remain unroaded and could be considered for wilderness recommendation at some time in the future. The activities proposed in all five action alternatives would affect the roadless character and wilderness characteristics of Gravina Island. Road construction and timber harvest would increase access from adjacent roaded areas and non-NFS lands, which is likely to increase human recreational use of the NFS lands in the interior of the island. The proposed harvest activities would occur in areas allocated to development LUDs, and the remaining western and southern majority would remain relatively unaffected and eligible for wilderness designation.

The potential for future development of adjacent non-NFS lands would also remain high because of the interests expressed by the public and other agencies in developing Gravina as opportunities present themselves. The State of Alaska Department of Natural Resources and Alaska Mental Health Trust have proposals for road construction and timber harvest on State lands. The Ketchikan Gateway Borough’s Gravina Island Plan presents opportunities for future projects on borough lands.

### Direct and Indirect Effects

#### Gravina Island Roadless Character

**Alternatives 1 and 5:** The roadless character of the Gravina roadless area would remain unchanged on National Forest System lands under Alternatives 1 and 5. Under the silvicultural prescriptions for Alternative 5, all units would be helicopter yarded and no new roads would be constructed. These helicopter units would be considered “roadless” in future roadless inventories, and would not reduce the size of Gravina Roadless Area #522. The harvest would affect the apparent naturalness of 803 acres, all located in the southern end of the island, by removing the timber cover. Even-aged and two-aged harvest prescriptions (363 acres) would result in a managed stand appearance, while uneven-aged harvest (440 acres) would leave a substantial portion of the timber standing and would exhibit a more natural appearance.

**Alternatives 2, 3, 4 and 6:** Implementation of Alternatives 2, 3, 4, or 6 would directly affect the roadless characteristics of Gravina Roadless Area #522 (Figures 3-8 to 3-11). The roadless character would be significantly reduced under these alternatives. The amount of reduction would vary by the alternative due to the number of roads and acres of harvest units. Alternative 2 would split the roadless area in two distinct parcels that would result in a combined reduction of approximately 9,894 acres or roughly 25 percent (Figure 3-9). Each of these parcels would be greater than 5,000 acres and could be considered for wilderness recommendation in the future.

Alternative 3 would reduce the amount of area containing roadless characteristics by approximately 7,960 acres or roughly 20 percent (Figure 3-10).



# 3 Environment and Effects

Alternative 4 would reduce the amount of area containing roadless characteristics by approximately 9,453 acres or roughly 24 percent (Figure 3-11). The peninsula east of Bostwick Inlet would only be connected by a very narrow corridor (600 feet wide) and would be functionally separated in terms of species that prefer interior habitat.

Alternative 6 would reduce the amount of area containing roadless characteristics by approximately 7,254 acres or roughly 19 percent (Figure 3-12). This alternative would have the least effect on the roadless area of the alternatives that involve road construction.

While these alternatives propose significant effects to the Gravina Roadless Area #522, they are not considered significant in context of the entire roadless area on the Tongass National Forest. The relative change to the 9.6 million acres of roadless area on the Tongass National Forest, identified in the Forest Plan SEIS, would be less than 1 percent.

**Soil, water, and air:** The Tongass Forest Plan Standards and Guidelines are designed to protect these resources while allowing timber harvest activities in development LUDs. None of the alternatives result in significant adverse effects on municipality supplies, soil, water, or air resources. These resources are further discussed in this chapter in the sections titled Soils, Watersheds, and Fisheries.

**Species diversity:** The action alternatives are not anticipated to reduce the species diversity within the project area. Habitat will be maintained to ensure viable populations of all wildlife species. The populations of some wildlife species, such as deer and wolves, could decrease as a result of the action alternatives. Of these alternatives, Alternative 4 is anticipated to have the greatest effect as a result of leaving much of the road system open to motorized access, resulting in increased hunter access and efficiency. For additional information on species diversity, see the Wildlife and the Old Growth and Biodiversity sections of this chapter.

**Habitat for threatened, endangered, proposed, candidate, and sensitive species and for those species dependent on large, undisturbed areas of land:** Those species populations would be protected as per Forest Plan Standards and Guidelines. See the Threatened, Endangered, and Sensitive Species section in this chapter for a discussion of these species in the project area and the biological evaluation (project file).

**Reference landscapes:** The action alternatives would incorporate the modifications to the small Old-growth Reserves (OGRs) recommended by the interagency review committee that results in an increase in the size of the three small OGRs. The OGRs would provide a suitable area to conduct comparison, evaluation, and monitoring of effects on the more intensively managed lands. These areas would remain in a natural setting, providing habitat for species that use old-growth habitats. The Biodiversity and Old Growth section of this chapter discusses Old-growth Habitat Reserves on Gravina Island.

**Natural appearance:** All the action alternatives adversely affect the natural appearance of Gravina Island as seen from the water and the neighboring communities of Ketchikan, Saxman, and Metlakatla. The degree of effect varies by alternative. Many of the harvest units use helicopter logging, incorporate topographical relief, and special silvicultural prescriptions to reduce these effects. See the Scenery section of this chapter for a discussion of scenic viewsheds and scenery values.

**Traditional cultural properties and sacred sites:** The Heritage Resources section of this chapter discusses the cultural history of Gravina Island and protective measures for heritage sites. No timber harvest or road construction activities are planned within the proximity of any known sites. Alternative 2 proposes a log transfer facility in Bostwick Inlet that would have a potential adverse effect on the availability and use of subsistence resources. See also the Environmental Justice and Subsistence sections of this chapter.

**Human disturbance:** Alternatives 1 and 5 would not result in an increase in human disturbance over the long term. Alternative 5 would result in a short-term increased human

disturbance as a result of helicopter timber harvest. Alternatives 2, 3, 4 and 6 would result in significant increases in the amount of human disturbance through short and long term. In the short term, road construction, and cable and helicopter timber harvest activities would increase the noise and possibility of human interaction. Alternatives 2, 3, and 6 would close all of the roads to motorized use after timber harvest. The roads would remain open to non-motorized use, which would increase recreational use of interior portions of the island. Interaction between user groups would be more likely to occur and noise associated with those users would increase. Alternative 4 would increase long-term human disturbance over the other action alternatives in that the classified roads would remain open yearlong to all user groups. The Socioeconomic and Recreation sections of this chapter contain additional information on human uses of the project area.

## Cumulative Effects

Cumulative effects are not anticipated for soil, air, species diversity, reference landscapes, threatened, endangered, proposed, candidate, and sensitive species. The area of cumulative effects analysis includes National Forest System lands and other ownerships on Gravina Island.

**Gravina Island roadless character:** At this time, no other Forest Service timber sales or development projects are planned within Gravina Roadless Area #522. However, Alaska Department of Natural Resources (DNR) and Alaska Mental Health Trust (AMHT) have indicated they will move forward with a timber sale on State and Mental Health Trust lands on Gravina Island regardless of activities on NFS lands. The roadless character of National Forest System lands would not change as a result of harvest activities on other ownerships.

A State timber sale would involve overland transport of logs to the existing LTF at the Pacific Log and Lumber Sawmill on the Tongass Narrows. This sale would propose timber harvest and road construction to access approximately 800 acres. Although the State sale would not involve any road construction or timber harvest on NFS lands, some timber harvest is likely to occur adjacent to the NFS boundary.

Alaska Mental Health Trust has plans to conduct timber harvest and road construction on portions of their lands just west of the airport (Figure 1-1). Initial estimates predicted approximately 40 acres of harvest, but may increase as more information is gathered.

Road construction or other development on non-NFS lands will not directly affect the Gravina roadless area, as these activities would not reduce the size of the roadless area lands, but would reduce the number of adjacent private lands that currently have roadless area characteristics. Cumulatively, there will be fewer acres roadless characteristics and roadless values on Gravina Island if timber harvest and road construction occurs on these private lands. These topics are discussed in the cumulative effects sections of the Silviculture and Timber Management and Transportation sections in this chapter.

**Water:** Resource management and development on private lands is anticipated to occur in the Vallendar and Bostwick watersheds in the near future. State best management practices would apply to these activities and adverse affects are anticipated to be minimal. This topic is discussed in the Watershed and Fisheries cumulative effects section of this chapter.

**Natural appearance:** The potential for timber harvest, road construction, and development of private lands have the potential to adversely affect the natural appearance of Gravina Island. See the Scenery section of this chapter for a discussion of cumulative effects on scenic viewsheds and scenery values.

**Human disturbance:** Adjacent State-owned lands are likely to support various future activities such as logging, roadbuilding, and potential land parcel sales, contributing to the amount of human disturbance on this roadless area. Road construction from the Tongass Narrows to State lands in the interior of the island would likely increase recreational access and use of adjacent NFS lands, lessening the opportunities for solitude and primitive recreation in these areas. (See the Recreation section in this chapter for additional discussion.) Human disturbance is anticipated to increase as a result of timber sales and road construction on

# 3 Environment and Effects

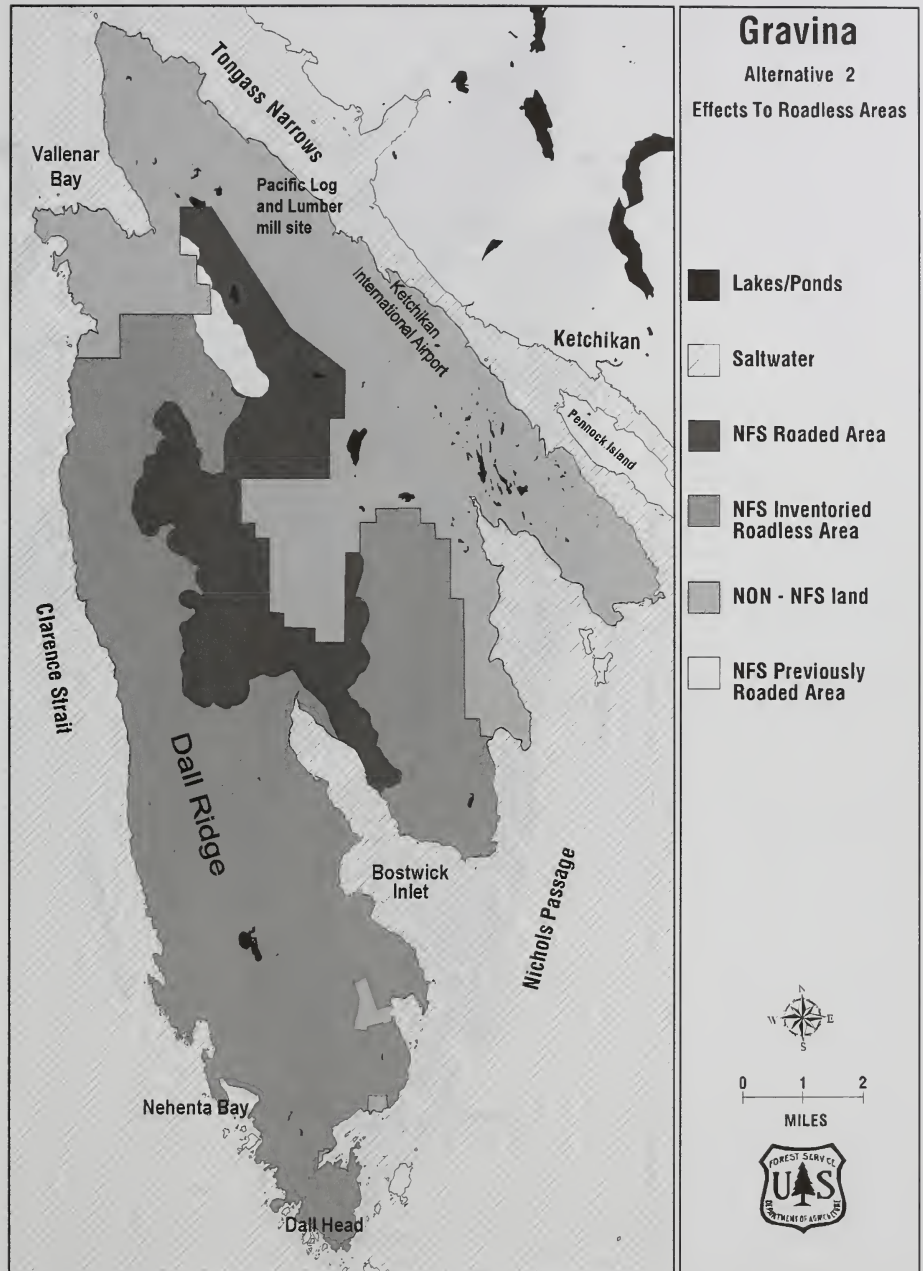
adjacent private lands. The disturbance would increase as a result of noise while these projects are being implemented and the additional access the associated roads would foster into areas with little human influence.

Human disturbance would also increase if a bridge is built in the future connecting the city of Ketchikan to Gravina Island. The improved access would allow larger volumes of potential recreation users to utilize the area, as compared to the limited capacity of the present ferry connection.

**Traditional cultural properties and sacred sites:** With an increase in motorized access to Gravina Island as a result of management actions on private lands and a possible connection with a bridge to Ketchikan, competition for subsistence resources would be likely to increase. Increased access by the general public may result in an increase in the vandalism of or inadvertent damage to culturally important sites. Additional information is contained in the cumulative effects discussions in the Heritage, Environmental Justice, Subsistence, and Socioeconomic sections of this chapter.



Figure 3-9  
Gravina Roadless Area 522 – Alternative 2



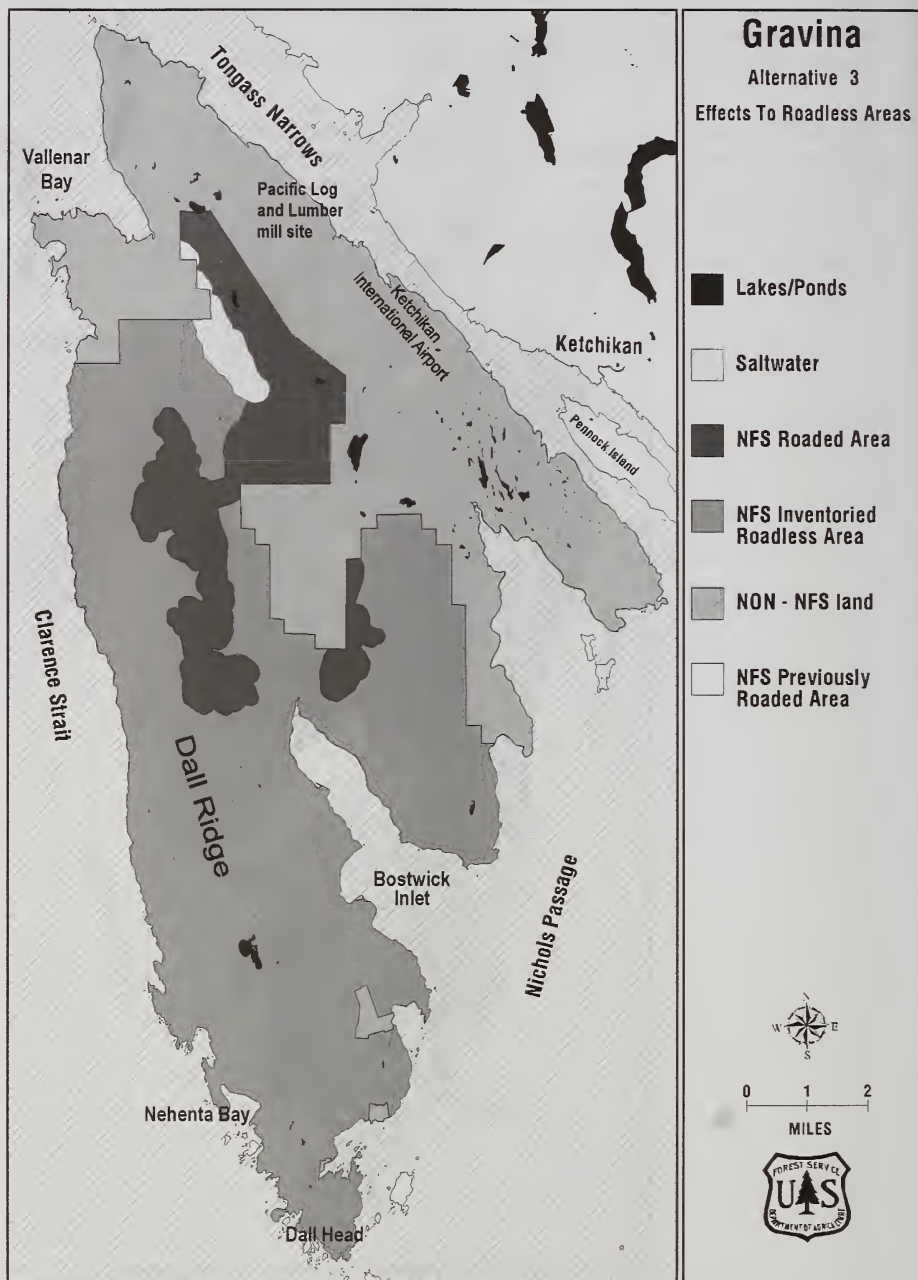
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Source: GIS, A. Grundy, 2003

Figure 3-10  
Gravina Roadless Area 522 – Alternative 3



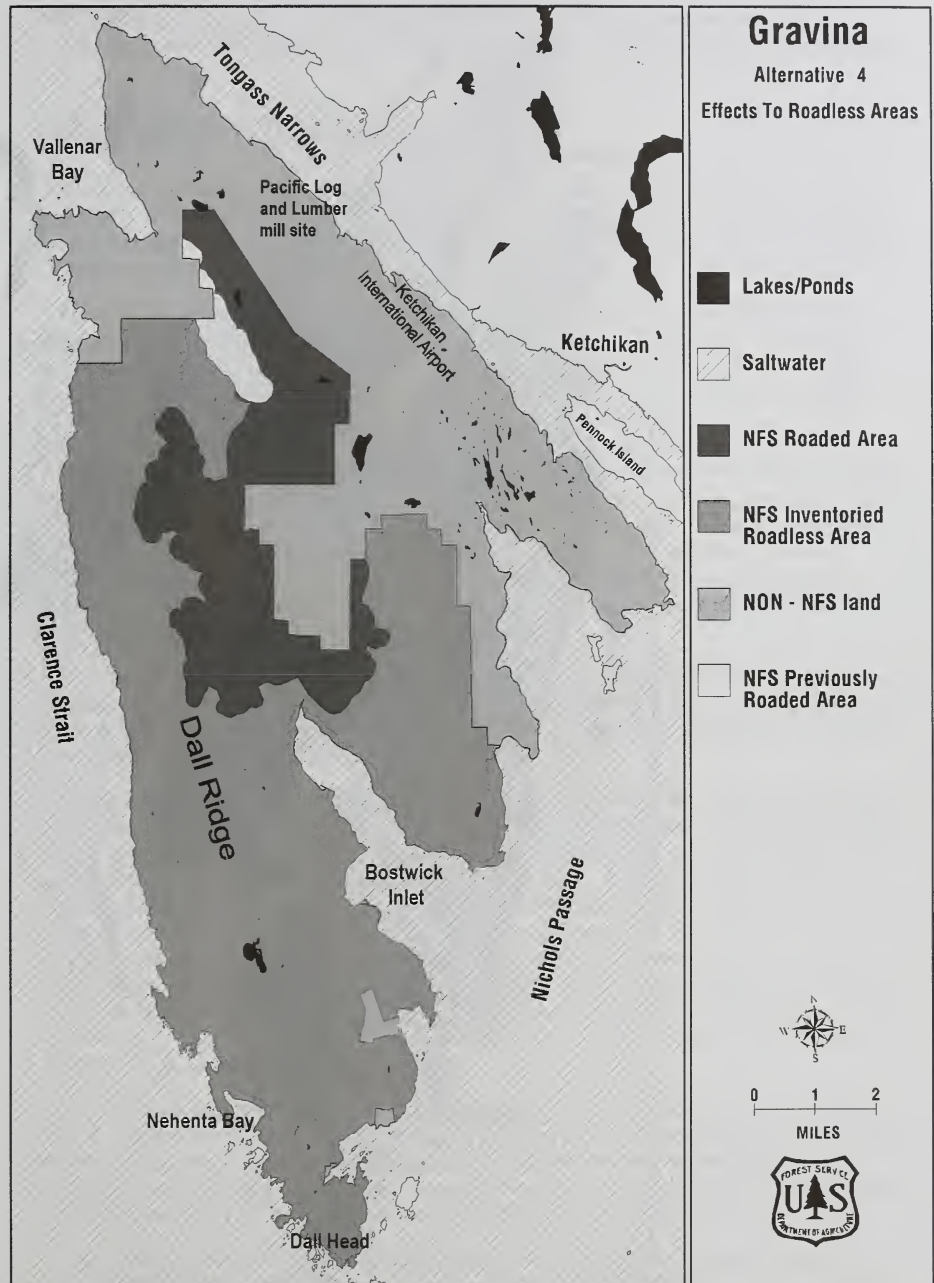
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Source: GIS, A. Grundy, 2003

Figure 3-11  
Gravina Roadless Area 522 – Alternative 4

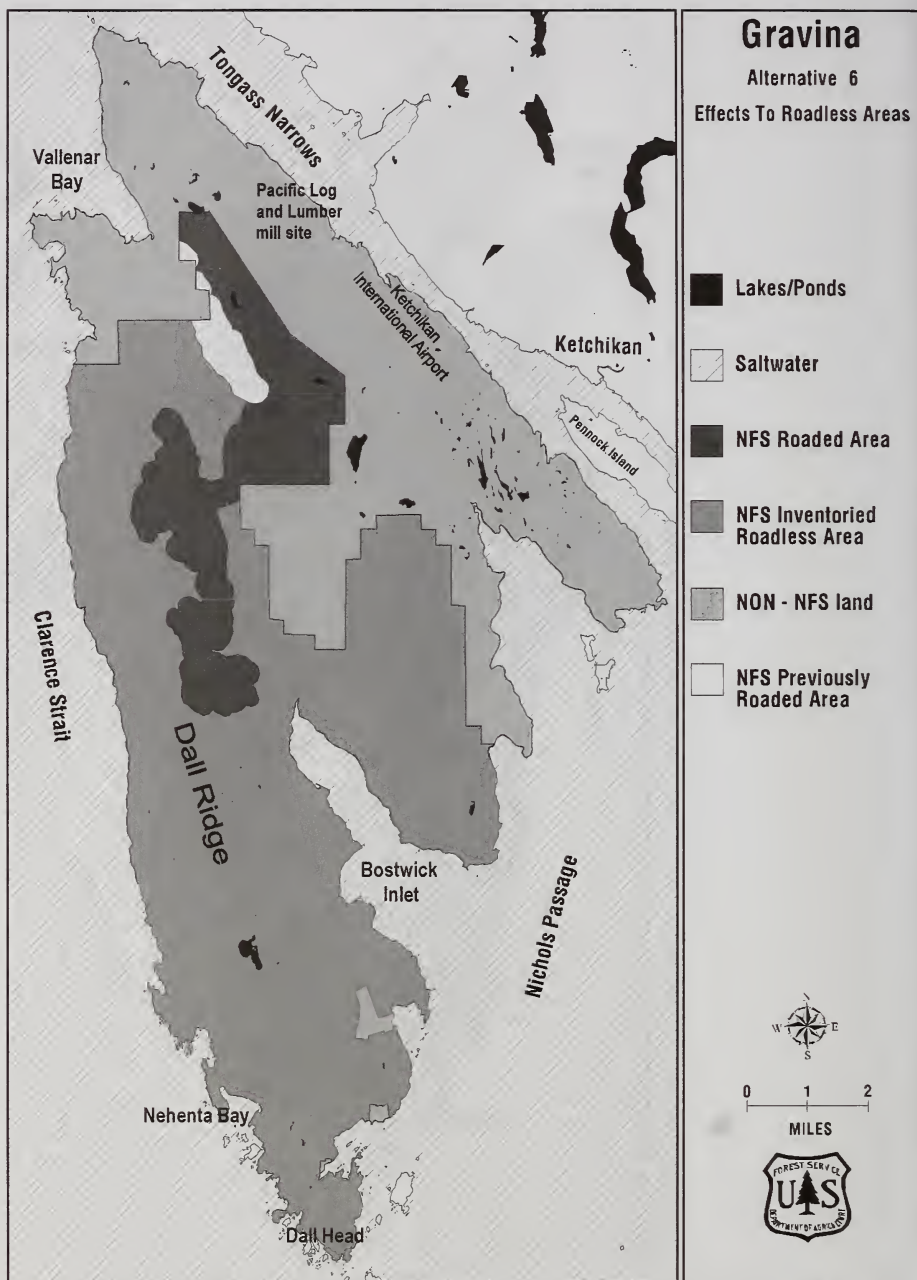


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Source: GIS, A. Grundy, 2003



Figure 3-12  
Gravina Roadless Area 522 – Alternative 6



Source: GIS, A. Grundy, 2003

## Scenery

The following discussions and analysis are based on and summarized from the Scenic Resources Report for the Gravina Island Timber Sale. This report is tiered to the Forest Plan.

## Affected Environment

### Landscape Character

The Tongass National Forest is divided into six landscape character types. These are large geographic areas that have general distinguishing visual characteristics. The Gravina Island project area is part of the Coastal Hills character type. The Coastal Hills type is characterized by broad rounded ridges or peaks with elevations averaging between 2,000 and 3,000 feet.

Within each character type, the National Forest visual management system classifies all National Forest System lands into one of three Variety Classes. These classes describe the landscape's inherent or natural scenic quality, based on the degree of variety of landform, vegetative patterns and water features. Variety Class A, Distinctive, includes areas where landform, vegetation patterns, water characteristics and possibly long-established cultural features combine to provide unusual, unique, or outstanding scenic quality. Variety Class B, Typical, includes areas where landform, vegetative patterns, water characteristics and cultural features combine to provide ordinary or common scenic quality. These are generally the more frequently found features in most areas. Variety Class C, Indistinctive, includes areas where landform, vegetative patterns, water characteristics and cultural features have low scenic quality, often water and rockforms of any consequence are missing, and the landscapes generally have weak or missing attributes of variety, vividness, pattern and other factors that contribute to scenic quality.

Variety Class A includes the southern end of Gravina Island between Bostwick Inlet and Clarence Strait, from the tip of Gravina to just north of DOWNDRAFT Lake, as well as the east side of the island from Bostwick Lake north along Tongass Narrows to the slopes opposite Ward Cove. The rest of Gravina Island is rated as Variety Class B.

Gravina Island is characterized by two major ridge systems that run the length of the east and west sides of the island. These ridges are composed of relatively rugged summits and general terrain. Elevations range from 1,500 feet to 2,730 feet. The eastern ridge is divided into two distinct components, separated by the Bostwick Lake basin. North of Bostwick Lake is a rugged, continuous ridge, characterized by side ridges with pronounced intermediate valleys, cirque basins, and small lakes. South of Bostwick Lake, a series of more isolated peaks extends south to the west side of Blank Inlet. The western ridge is composed of two sections. The northern half is characterized by a fairly uniform ridgeline, with moderate to gentle slopes facing the interior of the island and very steep and dissected slopes facing Clarence Strait. The southern half of this ridge is characterized by a much more rugged ridgeline, very dissected slopes, and a few cirque lake basins.

### Visual Quality Objectives

The Forest Plan expresses the desired future condition for Gravina Island in terms of Visual Quality Objectives (VQOs). VQOs are used to describe different desired levels of alteration of the natural landscape. The Forest Plan adopted VQOs that define the allowable extent of alteration one might expect when looking across a landscape. The VQOs for Gravina Island are Maximum Modification, Modification, Partial Retention, and Retention.

- **Maximum Modification:** Management activities may dominate the characteristic landscape, but will at the same time use naturally established form, line, color and texture. They should appear as natural occurrences when viewed from over 5 miles away.

## Project Area Viewsheds

- **Modification:** Management activities may dominate the characteristic landscape; however, they must borrow from natural form, line color, and texture so completely and at such a scale that the visual characteristics of the activity are those of natural features of the surrounding area.
- **Partial Retention:** Management activities may be evident but are subordinate to the characteristic landscape.
- **Retention:** Management activities are not evident to the casual visitor.

The following section describes the different viewpoints from the various visual priority routes and recreation use areas, travel routes and residential and urban areas from which the project is viewed, and then defines and describes the landscapes seen from these areas. One or more viewpoints were selected for each route or use area, for the purpose of analyzing the visual impacts to the viewsheds seen from these locations (Figure 3-13). The impacts from these viewpoints are considered to be fairly representative of the overall impacts from the routes or use areas they represent.

*Downtown Ketchikan and residential areas on hills above town (VP 1):* Most of the land visible on Gravina Island from Ketchikan and from residential areas is Borough, State of Alaska, or Mental Health Trust land, particularly along the immediate shoreline of the Tongass Narrows and most of the visible slopes north of the airport. National Forest System land visible from these areas includes much of the steep forested slopes directly west of the airport above the Bostwick Lake basin and many of the peaks to the south on the west side of Blank Inlet. All the National Forest System land visible from these areas is allocated to Timber Production with a Visual Quality Objective of Maximum Modification.

*Residential areas along South Tongass Highway south to Mountain Point (VP 2):* The National Forest System land seen from these locations is primarily portions of the series of ridges and knobs that rise above the western slopes of Blank Inlet. These slopes are approximately 7 miles from the viewing positions. Further in the background some of the slopes above the mouth of Bostwick Inlet are visible.

The slopes above Blank Inlet seen from Mountain Point are allocated to Timber Production with a VQO of Maximum Modification. The more distant slopes at the southern end of the island are allocated to Scenic Viewshed, with a VQO of Partial Retention.

*Blank Inlet (VP 3):* This bay is a popular boating and fishing area. A State-operated picnic site at Black Sands Beach and dispersed sites at beaches on Blank Islands are popular recreation sites at the mouth of this inlet. The flat landscape along the east shore of the bay and along the foreground areas of the west shore belongs to the State. The upper slopes of the rolling terrain and broad ridges of the west shore are National Forest System land. Most of the National Forest System land seen from this bay is allocated to Timber Production. The VQOs allocated to this area are Modification in the foreground and Maximum Modification in the middleground. The landscape behind the non-National Forest System land along the northwest shore of this inlet is allocated as an Old-growth Reserve with a VQO of Retention.

*Bostwick Inlet (VP 4, 5, 6):* This is a favorite beachcombing, fishing, crabbing and hunting area for Ketchikan and Metlakatla residents. The east slopes of this bay are generally steep and uniform and are covered with an unbroken forest canopy. The ridgeline is just over a half-mile from shore and these slopes are highly visible. Longer, gentler slopes broken by several prominent drainages characterize the west side of the inlet. The ridgeline on this side of the bay is about 2 miles from the shoreline. The view toward the head of the bay is a wide low-lying valley that is flanked on either side by the slopes of the two ridge systems described above. The east shore is allocated to timber production with a VQO of Modification in the foreground and Maximum Modification in the middleground. The west shore is also allocated to Timber Production with the same VQOs on the inside, and to Old Growth toward the outer portion of the bay. The VQO in the Old-growth Reserve is Retention.



*Seal Cove to Dall Bay (VP 7, 8):* From this location one can get a full view of the rugged and scenic southern end of Gravina Island. The slopes immediately back from the shore for about a mile are fairly flat, then abruptly steepen. Extensive rock out-crops and regenerated landslides are visible on the peaks and on some of the faces of these slopes. A few areas of recent timber harvest on private land are clearly visible on the slopes above Seal Cove. This viewshed is allocated to Scenic Viewshed. The VQOs are Retention in the foreground and Partial Retention in the middleground.

*Nichols Passage cruise ship route and small boat route (will see terrain similar to that seen from VPs 3, 4, 7 and 8):* This waterway is one of the routes used by some of the cruise ships entering the Ketchikan port from the south and leaving Ketchikan to the south. It is also used by many small boats headed for Bostwick Inlet and to the west side of Gravina Island including the Phocena Bay cabin and by many commercial fishing boats headed to the west side of the island or to southern Prince-of-Wales Island. All of the southern end of the island from Dall Bay to Gravina Pt. is visible. Also visible are some of the slopes around Bostwick and Blank Inlets. The southern portion of this viewshed, from the south side of the entrance to Bostwick Inlet to the southern tip of the Island is allocated to Scenic Viewshed where the adopted VQOs are Retention and Partial Retention. North of the Bostwick Inlet entrance, the viewshed is allocated to Timber Production or consists of private or State of Alaska land. The VQOs are Modification and Maximum Modification.

*West Shore Gravina - Dall Head to north of Phocena Bay (VP 9):* This is a favorite trolling area for sport and commercial fishermen. It is also part of the saltwater route to the Phocena Bay Forest Service cabin. From this vantage point the viewer sees very steep forested slopes often broken up by landslide paths and rock outcrops. The shoreline from the southern tip of Gravina to north of Phocena Bay is very irregular, with many coves and clusters of islands. This area is allocated to Scenic Viewshed. The VQOs are Retention in the foreground and Partial Retention in the middleground.

*Phocena Bay (VP 10):* This is the site of a Forest Service cabin which sits on the south shore of this bay. The same steep slopes and exposed rock peaks and ridges visible from viewshed above are seen close-up from this bay. This viewshed is also part of the Scenic Viewshed allocation that covers the southern part of the island. VQOs are Retention and Partial Retention.

*Clarence Straits cruise ship route (VP 14 views similar to that from VP 9 and VP 10):* This route is roughly a couple miles off the west shore of Gravina Island and is used by some cruise ships entering the Ketchikan port. The landscape seen from this route is characterized by the long, very rugged and steep Dall Ridge rising from the west shore of the island, and extending almost the entire length of the island. The southern half of this ridge is the steeper and more rugged portion of this landform, and consists of many rock cliffs. The northern half consists of slightly less rugged and steep terrain and fewer rock faces. The southern end of viewshed is allocated to Scenic Viewshed with adopted VQOs of Retention and Partial Retention. Most of the rest of this ridge facing this boat route is allocated as an Old-growth Reserve with a VQO of Retention.

*Metlakatla (VP 11):* The most prominent part of the viewshed seen from this Native community is the rugged terrain above the southern tip of Gravina and portions of the terrain between Blank and Bostwick Inlets. The portion of the viewshed between Bostwick and Blank Inlets is allocated to Timber Production with a VQO of Maximum Modification. A portion of this viewshed between the mouth of Bostwick Inlet and southern tip of Gravina is allocated to Scenic Viewshed. The VQO is Partial Retention in the background.

*Vallenar Bay (VP 13):* This is another popular boating and fishing area. Much of the land immediately around the bay is non-National Forest System land. The steep ridge above the east side of the Vallenar Creek valley is visible at a fairly oblique angle from the bay. National

# 3 Environment and Effects

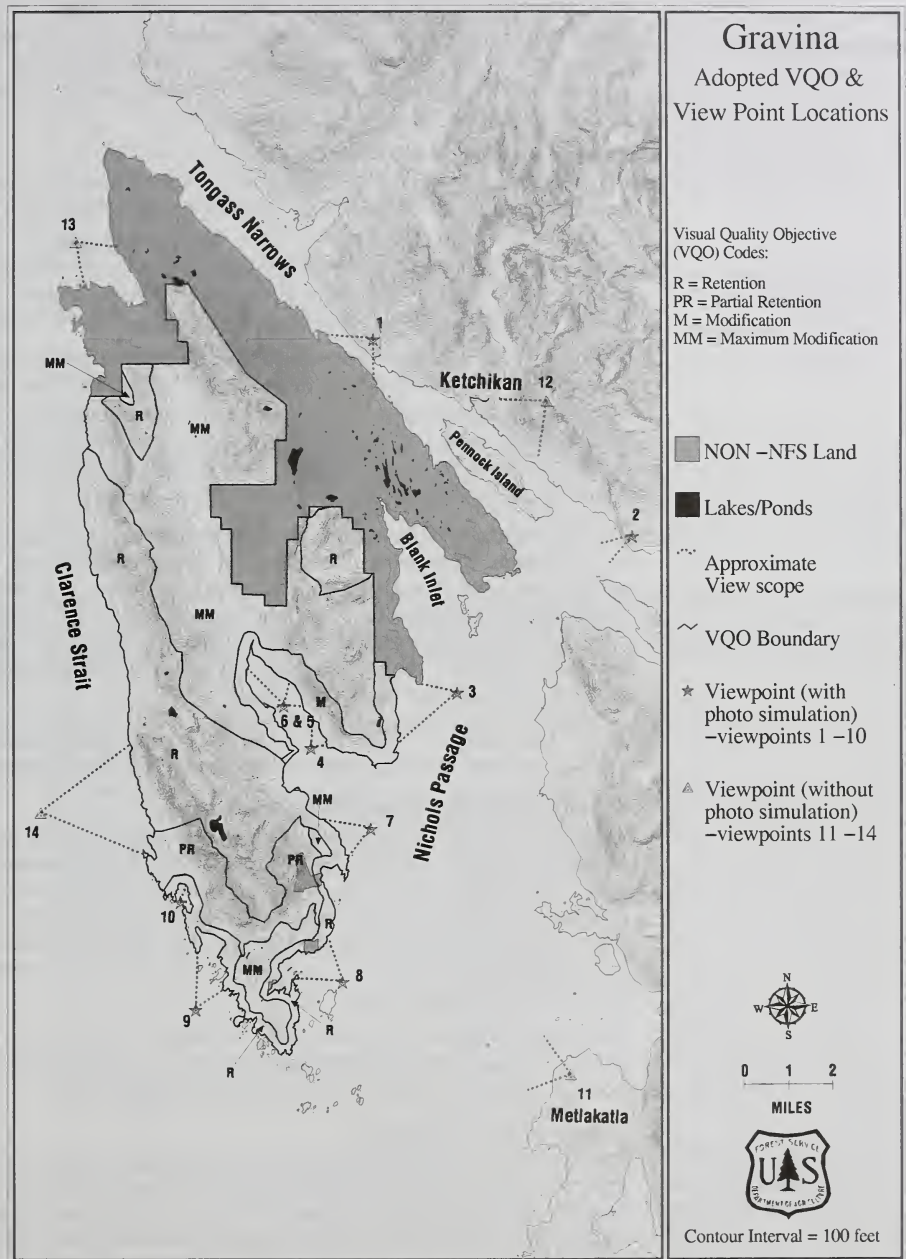
Forest System land seen from this bay is allocated to Timber Production with a VQO in the middleground viewshed of Maximum Modification.

*Deer Mountain (VP 12):* The top of Deer Mountain is the terminus of the Deer Mountain Trail. In addition to the east-facing slopes that border the Tongass Narrows being visible from the summit of this peak, portions of the interior valley between Dall Ridge and California Ridge are also visible. The visible slopes in this valley are about 7 miles from this viewpoint. Hence, except under the clearest viewing conditions, these slopes will not have an evident forested texture, but will have primarily a smooth bluish-gray tone. Most of the island seen from Deer Mountain is allocated to Timber Production. The exception is the southern end of the island, allocated to Scenic Viewshed. The adopted VQO in the Timber Production area is Maximum Modification and the adopted VQO in the Scenic Viewshed portion is Partial Retention.

## Existing Visual Condition

The majority of National Forest System lands in the above viewsheds are in a natural unaltered condition, with a few exceptions. A large harvest area on the steep slopes above the east side of Vallenar Creek is 42 years old. This viewshed is considered to be in a moderately altered condition due to the extensive amount of forested texture that has returned to this slope. A large tract (573 acres) of harvested private land on the lower slopes above Seal Cove can be seen from the mouth of Bostwick Inlet and along southern Nichols Passage. In spite of the scale of the harvest, this activity has created only a moderately altered scenic condition primarily because in its present state of regeneration, the area tends to blend with the natural rock outcroppings above it and the low-volume vegetation to the east.

Figure 3-13  
Gravina Island Project Adopted VQO and View Point Locations



AML:\fsfiles\unit\cm\timber\personal\al\aml\grv\isp811feis.aml

MAP:\fsfiles\office\gis\gravina\alav\postscrnp\grv\isp811feis.eps

October 15, 2003

A. Grundy

Source: GIS, A. Grundy, 2003



## Effects of Timber Harvest and Roadbuilding

### Environmental Consequences

To discuss the overall scenic impacts on Gravina Island from the different action alternatives, the project area is divided into three general geographic areas: 1) the central interior of the island on either side of the drainages that run into Bostwick Inlet and Vallenar Bay, 2) the area between Blank Inlet and Bostwick Inlet, and 3) the southern end of the island from the mouth of Bostwick Inlet around the southern tip of the island and up the west side of the island to just north of Phocena Bay.

#### Central Interior of the Island

Alternatives 2, 3, 4, and 6 all include clusters of harvest units that range in size from approximately 10 acres to 180 acres. This portion of the island has all of the units that are road accessible and cable yarded in the project. Most of these units would be harvested with an even-aged system resulting in large openings. However, the largest units would be harvested through a two-age with reserves or uneven-aged system. The reserves, which serve as wildlife habitat and stream buffers, would provide variation across the landscape.

An arterial road would connect most of these units, with spurs extending from the arterial. This road network would ring the core of the island. In this part of the project area there would be visual impacts associated with roads, including a cleared right-of-way corridor, the roadbed, cut and fill slopes along some portions of the corridor, and several rock pits scattered throughout the road system. The visual impact of these rockpits from the road would be mitigated somewhat by locating as many as possible off the main arterial.

The main road corridor would pass through extensive harvest areas. However, in some places reserve islands would be left along the main corridor to provide the periodic experience of walking or driving through old-growth stands. In Alternative 2, this road network would be confined to the interior of the island. In Alternatives 3, 4, and 6 this road corridor would extend across private, Borough and State lands east to Bostwick Lake and then to the Tongass Narrows just north of the airport runway. Alternative 5 does not propose any roading or harvesting in the central core of the island.

After approximately 10 years, this area of harvesting would be characterized by patches of light green spread over the valley slopes as regeneration becomes established.

#### Area Between Blank and Bostwick Inlets

Alternatives 2, 4 and 5 all propose a string of helicopter units (ranging in size from 10 to 20 acres) on the eastern slopes above Bostwick Inlet and above Stomach Bay at the mouth of Blank Inlet. There would be no roads and the accompanying visual impact from roading. In addition, many of these units would retain 50 percent of their trees. Therefore, much of the forested texture over this landscape would be only slightly impacted. Alternative 3 would have less impact than Alternatives 2, 4, and 5 because of the absence of units along the northeastern slopes of Bostwick Inlet.

After about 20-30 years of regeneration, the small openings created in these helicopter-logged areas would not be visible. Alternative 6 includes no units along the east shore of Bostwick, but does include the cluster of four units above Stomach Bay.

#### Southern End of Gravina

Alternatives 2, 3, and 6 include a cluster of helicopter units above Phocena Bay and Nehenta Bay, and a group of helicopter units around Seal Cove and the mouth of Bostwick Inlet. No roads would be constructed. Almost all the units would retain at least 50 percent of the trees. The forested texture on this steep and rugged terrain would be moderately impacted. In portions of this landscape, some created openings within these helicopter units would blend with nearby natural openings created by landslides or blowdown. Alternatives 4 and 5 include a few additional helicopter units above Nehenta Bay and Dall Bay, so overall visual impacts

## Effects of Log Transfer Facilities and Camps

would be slightly greater in these two alternatives. As mentioned above, the evidence of harvest in the small openings would not be visible after 20-30 years of regeneration.

### Log Transfer Facility

Alternative 2 proposes to construct a log transfer facility (LTF) in Bostwick Inlet. The proposed facility is a 250-foot long rock fill pier, ending in a 40-foot wide bulkhead that would be about 26 feet high at low tide. This facility would dominate the view of the northeastern shore of the inlet, particularly from Viewpoint 5 inside the inlet. Since its lines and form would not relate to any natural elements along the beach, this development would not meet the adopted foreground VQO of Modification from viewpoints in the inner portion of the inlet. From viewpoints in outer Bostwick Inlet and along Nichols Passage (2-5 miles away) the facility would not be as visually dominating.

### Logging Camps

Due to the proximity of the city of Ketchikan, no land or float camps are anticipated for any of the action alternatives. Under Alternative 2, a 1-3 acre sortyard would be required near the LTF in Bostwick Inlet. In all alternatives, upland developments would consist of temporary structures such as maintenance shops and fuel storage tanks. These facilities would have minimal permanent visual resource impacts.

## Direct and Indirect Effects

The following sections describe the effects of the five action alternatives on the scenic conditions as they would appear from the project area viewpoints (displayed in Figure 3-13). This assessment of scenic conditions attained (Visual Quality Objectives met) in the viewsheds is based on the use of specific design measures and harvest treatments in certain critical units. (These measures are described in the unit cards, Appendix B of the Draft EIS, and discussed below.)

Appendix E includes visual simulations from ten of the viewpoints. These simulations display what the proposed harvest may look like for the particular units. On-the-ground factors such as topography, slope, streams, and location of reserve trees may cause the actual harvest units to look slightly different after harvest.

## Alternative 2

*Downtown Ketchikan and residential areas (VP 1):* No units would be visible from this viewpoint.

*Residential areas along South Tongass to Mountain Point (VP 2):* The potential impact from these viewpoints is from Unit 63, which would sit on the lower slopes of a ridge above Stomach Bay. This would be the only unit clearly visible from the South Tongass/Mountain Point area. A long undulating backline and some harvest ground below it would be visible. This unit would be yarded by helicopter. If this unit were entirely clearcut it would meet a Modification VQO. However, the layout of this unit would follow one of two strategies to minimize its visual impact. One would lower the backline in several places. The second would retain 40 percent of the stand structure in the upper part of the unit and 20 percent in a band through the middle of the unit. Either of these approaches would break up the elongated opening in this forested slope and would help this harvest attain a VQO closer to Partial Retention, two levels higher than the adopted VQO. Two other units (73 and 86) would be seen from this viewpoint; however, because of their distance, design and aspect, these units would produce very minor impacts from these viewpoints.

*Blank Inlet (VP 3):* Unit 63 on the middleground ridge above Stomach Bay would be the only visible unit. From most viewing positions in the inlet, the intervening terrain would block much of this unit from view. From many viewpoints, only a small upper lobe of the unit would be visible. In addition, some of the stand structure would be retained in visible portions of the unit. This overall scale of harvest would meet the Partial Retention VQO from most of the inlet.

*Bostwick Inlet (VP 4, 5, 6):* The visual impacts to this bay would be from the string of units (58, 60, 64, 66, 68, and 72) along the steep foreground slopes above the east shore of Bostwick

### 3 Environment and Effects

**Inlet.** At the head of the bay, Unit 45 would be visible on the middleground slopes back from the northeast shore of Bostwick. The units along the east shore would be helicopter yarded and would consist of scattered small openings of approximately 2 acres or smaller. Approximately 50 percent of the trees would be retained to maintain significant amounts of forested texture on these slopes. The impact in portions of these units would be small openings in the canopy, creating scattered small areas of visible harvested ground. In many other portions of the units, the impact would be no more than very small shadowy breaks in the canopy where no harvested ground would be visible. Given this scenario, these units would meet a Partial Retention VQO.

Most of Unit 45 would be visible from an oblique angle from viewing points along the west shore of the upper part of the bay. The southern half of the unit would be prescribed as a group selection, where the trees would be taken in small groups or in strips, retaining approximately 50 percent of the stand. Due to this prescription and the orientation of the unit, only breaks in the forested canopy, or at most only very small slivers of harvested ground, would be visible. Therefore, the harvest in this part of the viewshed would meet close to a Partial Retention VQO. Harvest on the slopes above the northwest and southwest corner of the inlet would meet the Partial Retention VQO, due to the small size of the visible units (units 40, 53, 56 and 73) and their placement and oblique orientation to the viewer.

*Seal Cove to Dall Bay (VP 7, 8):* Units 73 and 86 would have potential visual impacts due to the steepness of portions of the units. These are helicopter-yarded units that would include a significant amount of tree retention in the steeper portions of the units. The impact in portions of these units would be small openings in the canopy, creating scattered small areas of visible harvested ground. In many other portions of the units, the impact would be no more than very small shadowy breaks in the canopy where no harvested ground would be visible. In all cases, the adopted VQO of Partial Retention would be met.

*Nichols Passage cruise ship and small boat route (will see terrain similar to that seen from VPs 3, 4, 7 and 8):* From the middle of this waterway, impacts from Units 63, 73 and 86 would be similar to that described for the above viewshed. However, a viewer in the middle of the channel would now see all these units together. Unit 63 would be slightly more visible from the middle of Nichols Passage than from Blank Inlet, due to less landform screening. The overall impact of all these units would still meet a Partial Retention VQO in the Scenic Viewshed portion of the viewshed south of Bostwick Inlet, and a Modification VQO in the Timber Production portion north of Bostwick.

*West Shore Gravina - Dall Head to north of Phocena Bay (VP 9):* Units 75 and 80 just north of Phocena Bay and units 88, 89, 107 and 108 above Phocena Bay and Nehenta Bay would create the potential impacts from these viewpoints. All of these units are proposed as helicopter units and most have been prescribed for 50 percent retention. In all of these, much of the forest texture would be retained. In some units, such as 88 and 89, very small openings may be incorporated where they would blend with existing openings that have been created by slides or blowdown. The impact in portions of these units would be small openings in the canopy, creating scattered small areas of visible harvested ground. In many other portions of the units, the impact would be no more than very small shadowy breaks in the canopy where no harvested ground would be visible. All these units would meet the Partial Retention objective.

*Clarence Strait cruise ship route (VP 14 views similar to that from VP 9 and VP 10):* The impact of units 75, 80, 88, 89, 107 and 108 would be similar to that described from the "West Short Gravina" viewshed. From viewpoints along this route, this harvest would meet a Partial Retention VQO.

*Phocena Bay (VP 10):* From this viewpoint the visible units would be 88, 89, and 107. As mentioned above, much of the forested texture would be retained in these units. The nature of the impacts would be similar to that described above for the West Shore Gravina viewing area.



The impact of this harvest would meet the Partial Retention VQO. From the cabin site, these units would have no visual impact due to the screening of the shoreline vegetation.

*Metlakatla (VP 11):* From this viewpoint, units 63, 68, 72, 73 and 86 are the ones with potential impacts. However, because of the distance of these units (6-8 miles from Metlakatla), and the fact that they would have a significant amount of forested texture left on the visible steeper slopes, this harvest would meet at least a Partial Retention VQO.

*Vallenar Bay (VP 13):* The impact from this bay would be created by units 4, 8, 11, 13 and 15. These units would generally occur on a series of individual slopes, one above the other. The major impact would come from the distinct backlines that would be apparent because most of the upper boundaries are along the middle of these different slopes. Leaving groups of trees scattered near the back edges of these units would soften the sharp edge of these backlines. With these measures, these units would meet the Maximum Modification VQO.

*Deer Mountain (VP 12):* Several units on the east-facing slopes below Dall Ridge would be visible from the top of Deer Mountain. Units 17, 28, 30, 40 and 63 would be the more prominent units. Some of these units, particularly 17 and 28, would have roughly 30 to 50 percent of the trees retained in reserve areas. Units 17 and 28 would be logged by helicopter. These factors and the distance these units are from this viewing point would significantly soften the contrast created by these units, and enable this harvest to meet at least the adopted VQO of Maximum Modification in this background viewshed.

## Alternative 3

*Downtown Ketchikan and residential areas (VP 1):* Unit 5 is the only unit that has potential for impact from downtown Ketchikan and west-end residential areas. This unit would be located on the steep face of a prominent knob between two larger peaks. Unit 5, which is 17 acres in size, would be visible from many vantage points downtown, all along Tongass Avenue, and particularly from the residential streets above the west end of town. In Alternative 3, this unit would be harvested as a partial cut. Most of the harvest would be individual tree selection. The few small openings created would be positioned to blend in with the natural openings near the top of the unit and the slide path that runs through the middle of the unit. Close to 75 percent of the trees would be retained in this 17-acre unit. This harvest is intended to meet a Retention VQO- i.e., not be evident from the many viewpoints throughout town.

*Residential areas along South Tongass to Mountain Point (VP 2):* Similar to Alternative 2, Unit 63 would be most visible. This alternative adds a few very small units adjacent to 63 - units 69, 70 and 71. Of these, only Unit 69, appearing as a small, narrow sliver-like opening, would add very slightly to the visual impacts.

*Blank Inlet (VP 3):* Unit 63 would be harvested in this alternative. This alternative adds two small units, 70 and 71, that would be only slightly visible. Impacts would be slightly greater than those described in Alternative 2.

*Bostwick Inlet (VP 4, 5, 6):* The major impacts to this bay would be from two of the units (58, 60) along the steep foreground slopes above the east shore of Bostwick Inlet. These units would be helicopter yarded and would consist of scattered small openings no more than approximately 2 acres. Roughly 50 percent of the trees would be retained to maintain significant amounts of forested texture on these slopes. As described in Alternative 2, impacts would range from small shadowy breaks in the canopy where no harvested ground is visible to small openings where only very small patches of harvested ground are visible. Given this scenario, this harvest would meet a Partial Retention VQO. There would be no impacts on most of the steeper slopes above the east shore. Unit 45 would also be harvested in this alternative and the impacts would be the same as described in Alternative 2.

Harvest on the slopes above the northwest corner of the inlet would meet the Modification VQO because of the addition of Unit 62, which would dominate the view much more than units 40, 53, 54, and 56.

### 3 Environment and Effects

*Seal Cove to Dall Bay (VP 7, 8):* In addition to units 73 and 86, units 74 and 94 have potential for visual impact due to the steepness of small portions of these units. These are all helicopter-landed units that would include a significant amount of tree retention in the steeper portions of the unit. The nature of the impact would be similar to that described for Alternative 2. The VQO of Partial Retention would be met.

*Nichols Passage cruise ship and small boat route (will see terrain similar to that seen from VPs 3, 4, 7 and 8):* This alternative would have slightly greater impacts from this boat route than Alternative 2, due to the addition of Unit 94. This helicopter unit also calls for approximately 40 percent retention throughout the unit and 50 percent on steeper ground. From the middle of this waterway, all this harvest would meet a Partial Retention VQO in the Scenic Viewshed portion of the viewshed south of Bostwick Inlet and Modification in the Timber Production portion of the viewshed north of Bostwick.

*West Shore Gravina - Dall Head to north of Phocena Bay (VP 9):* Units 75 and 80 just north of Phocena Bay and units 88, 89, 90, 91, 92, and 93 above Phocena Bay and Nehenta Bay would create the potential impacts from these viewpoints. All of these units are helicopter units and most have been prescribed for 50 percent retention. In all of these, much of the forested texture would be retained. In some units, such as 88 and 89, very small openings may be incorporated where they would blend with existing openings that have been created by slides or blowdown. The nature of the impact would be the same as described in Alternative 2. All these units would meet the Partial Retention objective.

*Clarence Strait cruise ship route (VP 14 views similar to that from VP 9 and VP 10):* The impact of units 75, 80, 88, 89, 90, 91, 92 and 93 would be similar to that described from the "West Shore Gravina" viewshed. From viewpoints along this route, this harvest would meet a Partial Retention VQO.

*Phocena Bay (VP 10):* From this viewpoint, the visible units would be 88, 89, 90, 91, 92, and 93. As described above, much of the forested texture would be retained. The nature of the impact would be the same as described in Alternative 2. This harvest would meet a Partial Retention VQO. As in Alternative 2, there would be no impact from the Phocena Bay cabin site.

*Metlakatla (VP 11):* From this viewpoint, units 63, 70, 73, 86 and 94 could have potential impact. However, because of the distance of these units (6-8 miles from Metlakatla), and the fact that they would have a significant amount of texture left on the visible steeper slopes, this harvest would meet at least Partial Retention VQO.

*Vallenar Bay (VP 13):* The impact of harvest in this alternative would be the same as described in Alternative 2.

*Deer Mountain (VP 12):* From Deer Mountain, the impact of this alternative would be slightly greater than Alternative 2. In addition to the units visible in Alternative 2, units 69, 70, and 71 may be slightly visible from Deer Mountain summit.

#### Alternative 4

*Downtown Ketchikan and residential areas (VP 1):* Unit 5 above the airport is also included in this alternative. Visual impacts would be the same as described under Alternative 3.

*Residential areas along South Tongass to Mountain Point (VP 2):* Impacts would be the same as described in Alternative 3.

*Blank Inlet (VP 3):* Impacts would be the same as described in Alternative 3.

*Bostwick Inlet (VP 4, 5, 6):* The major impacts to this bay would be from units (58, 60, 64, 66, 68, and 72) along the steep foreground slopes above the east shore of Bostwick Inlet. At the head of the bay, Unit 45 would also be included in this alternative. Visual impacts would be the same as described under Alternative 2. Harvest on the slopes above the northwest corner of

the inlet would meet the Modification VQO. This alternative harvests the same visible units as Alternative 3 – units 62, 56, 54, 53, and 40.

*Seal Cove to Dall Bay (VP 7, 8):* Units 73, 74, 78, 86, 94, 96, 105 and 106 have potential visual impact due to location or steepness of portions of these units. These are all helicopter-yarded units that would include a significant amount of tree retention in the steeper portions of the unit. In all cases, the adopted VQO of Partial Retention would be met.

*Nichols Passage cruise ship and small boat route (will see terrain similar to that seen from VPs 3, 4, 7 and 8):* In this alternative, units visible from this boat route would include portions of 63, 104, 73, 78, 86, 94, 96, 105 and 106. Impacts would be similar to those described for the previous viewshed. Because of the greater number of units, this alternative would have slightly greater impacts than in Alternatives 2 and 3, but the nature of the impacts would be similar. As in the other alternatives, a viewer in the middle of the channel would more readily view all of these units together than from the near-shore viewpoints between Seal Cove and Dall Bay. In addition, more of Unit 63 and portions of Unit 104 would be visible from the middle of the channel. Due to the approximately 50 percent retention of trees in most of these units, this harvest would meet a Partial Retention VQO in the Scenic Viewshed portion of this viewshed. Unit 63 would meet a Modification VQO in the Timber Production portion of the viewshed.

*West Shore Gravina - Dall Head to north of Phocena Bay (VP 9):* Units 75 and 80 just north of Phocena Bay and units 88, 89, 90, 91, 92, 93, 107 and 108 above Phocena Bay and Nehenta Bay would create the potential impacts from these viewpoints. All of these units are proposed as helicopter units and most of the units have been prescribed for 50 percent retention. In all of these, much of the forested texture would be retained. In some units, such as 88 and 89, very small openings may be incorporated where they would blend with existing openings that have been created by slides or blowdown. All these units would meet the Partial Retention objective. Because this alternative includes all of the units (90, 91, 92, 93, 107, and 108) above Nehenta Bay, it would create slightly more impact than Alternatives 2 and 3.

*Clarence Strait cruise ship route (VP 14 views similar to that from VP 9 and VP 10):* The impact of units 75, 80, 88, 89, 90, 91, 92, 93, 107 and 108 would be similar to that described from the “West Shore Gravina” and the “Phocena Bay” viewsheds. This alternative would have slightly greater impact than Alternatives 2 and 3 due to the addition of units 90, 91, 92 and 93. From viewpoints along this route, this harvest would meet a Partial Retention VQO.

*Phocena Bay (VP 10):* From Phocena Bay, the units that have potential visual impacts include 88, 89, 90, 91, 92, 93, 107, and 108. As mentioned above, much of the forested texture would be retained in these units. Though slightly more visual impact would be created than in Alternatives 2 and 3, this level of harvest would still meet the Partial Retention VQO.

*Metlakatla (VP 11):* From this viewpoint, units 63, 68, 70, 72, 73, 78, 86, 94, 96, 105, and 106 are the ones with potential impact. Because of the distance of these units (6-8 miles from Metlakatla), and the fact that they would have a significant amount of texture left on the visible steeper slopes, this harvest would meet at least Partial Retention VQO.

*Vallenar Bay (VP 13):* The impact of harvest in this alternative would be the same as described in Alternative 2.

*Deer Mountain (VP 12):* From Deer Mountain the impact of this alternative would be very similar to Alternative 3. Unit 104 may also be slightly visible from Deer Mountain summit.

*Downtown Ketchikan and residential areas (VP 1):* No units would be visible from this area. Unit 5 is not included in this alternative.

*Residential areas along South Tongass to Mountain Point (VP 2):* Impacts would be slightly more than those described for Alternative 3. Units 38 and 42 would also be visible from this viewpoint. A Partial Retention VQO would still be met because of the distance and obliqueness of these units.

## Alternative 5



### 3 Environment and Effects

*Blank Inlet (VP 3):* Alternative 5 includes units 42, 38, and 63. Because of the distance separating units 42, 38 and 63, this alternative would also meet a Partial Retention VQO.

*Bostwick Inlet (VP 4, 5, 6):* The major potential impact to this bay would be from the string of units (58, 60, 64, 66, 68, 72) along the steep foreground slopes above the east shore of Bostwick Inlet. At the head of the bay, Unit 45 would be included in this alternative. Visual impacts along the eastern slopes of the bay would be the same as described in Alternative 2. However, this alternative does not include any of the units above the northwest corner of the bay or along the western slopes of the upper Bostwick valley. Hence the landscape up the valley would remain in an unaltered condition.

*Seal Cove to Dall Bay (VP 7, 8):* Units 73, 74, 86, 94, 96, 105 and 106 have potential visual impact due to the location or steepness of portions of these units. These are all helicopter-yarded units that would include a significant amount of tree retention in the steeper portions of the unit. The impact of all this harvest would meet the adopted VQO of Partial Retention.

*Nichols Passage cruise ship and small boat route (will see terrain similar to that seen from VPs 3, 4, 7 and 8):* Impacts from this alternative would be virtually the same as Alternative 4, except that it does not include Unit 78.

*West Shore Gravina - Dall Head to north of Phocena Bay (VP 9):* This alternative includes the same units as Alternative 4. The impacts of this alternative would be the same as those described for Alternative 4.

*Clarence Strait cruise ship route (VP 14 views similar to that from VP 9 and VP 10):* The impacts from this alternative would be the same as Alternative 4.

*Phocena Bay (VP 10):* This alternative includes the same units as Alternative 4. The impacts would be the same as described for Alternative 4.

*Metlakatla (VP 11):* From this viewpoint, units 68, 63, 70, 72, 73, 86, 94, 96, 105, and 106 are the ones with potential impact. Because of the distance of these units (6-8 miles from Metlakatla), and the fact that they would have a significant amount of texture left on the visible steeper slopes, this harvest would meet at least Partial Retention VQO.

*Vallenar Bay (VP 13):* This alternative does not include any units at the head of the Vallenar Creek valley. There would be no impact to this viewshed in this alternative.

*Deer Mountain (VP 12):* Units near the mouth of Bostwick Inlet and Blank Inlet (38, 42, 63, 69, 70, 71, and 104) may be slightly visible from the summit of Deer Mountain. They would meet the appropriate VQOs.

#### Alternative 6

The impacts of this alternative would be the same as Alternative 3, with the following exceptions (see Table 3-32).

*Bostwick Inlet (VP 4, 5, 6):* There would be no harvest along the northeast shore of Bostwick Inlet, and this part of the viewshed would remain in a natural condition.

*Vallenar Bay (VP 13):* Unit 11 would not be harvested in this alternative. The impacts would be slightly less than those described for Alternatives 2, 3, and 4.

*Deer Mountain (VP 12):* Units harvested and impacts of this alternative would be the same as described for Alternative 4 because of the addition of Unit 104.

**Table 3-32**  
**Summary of Units Visible in Viewsheds**

Viewshed (Viewpoint) <sup>1</sup>	Unit Numbers in Alternatives				
	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
Downtown Ketchikan (VP1)	None	5	5	None	5
South Tongass Hwy (VP2)	63	63, 69	63, 69	38, 42, 63 69	63, 69
Blank Inlet (VP3)	63	63, 70, 71	63, 70, 71	42, 38, 63 70, 71	63, 70, 71
Bostwick Inlet (VP4, 5, 6)	40, 45, 53 56, 58, 60 64, 66, 68 72, 73	40, 45, 53 54, 56, 58 60, 62	40, 45, 53 54, 56, 58 60, 62, 64 66, 68, 72	58, 60, 64, 66, 68, 72, 45	40, 53, 54 56, 62
Seal Cove/Dall Bay (VP7, 8)	73, 86	73, 74, 86 94	73, 74, 78 86, 94, 96 105, 106	73, 74, 86 94, 96, 105 106	73, 74, 86 94
Nichols Passage (VP3, 4, 7, 8)	63, 72, 73 86	63, 70, 71 73, 74, 86 94	63, 70, 71 72, 73, 74 78, 86, 94 96, 105, 106	38, 42, 63 70, 71, 72 73, 74, 86 94, 96, 105 106	63, 70, 71 73, 74, 86 94
West Shore Gravina (VP9)	75, 80, 88 89, 107 108	75, 80, 88 89, 90, 91 92, 93	75, 80, 88 89, 90, 91 92, 93, 107 108	75, 80, 88 89, 90, 91 92, 93, 107 108	75, 80, 88 89, 90, 91 92, 93
Phocena Bay (VP10)	88, 89, 107	88, 89, 90 91, 92, 93	88, 89, 90 91, 92, 93 107, 108	88, 89, 90 91, 92, 93 107, 108	88, 89, 90 91, 92, 93
Clarence Strait (VP14)	75, 80, 88 89, 107 108	75, 80, 88 89, 90, 91 92, 93	75, 80, 88 89, 90, 91 92, 93, 107 108	75, 80, 88 89, 90, 91 92, 93, 107 108	75, 80, 88 89, 90, 91 92, 93
Metlakatla (VP11)	68, 72, 86 63, 73	63, 70, 73 86, 94	63, 68, 70, 72, 73, 78, 86, 94, 96, 105, 106	63, 68, 70 72, 73, 86 94, 96, 105 106	63, 70, 73 86, 94
Vallenar Bay (VP13)	4, 8, 11, 13 15	4, 8, 11, 13 15	4, 8, 11, 13 15	None	4, 8, 13, 15
Deer Mountain (VP12)	17, 28, 30 40, 63	17, 28, 30 40, 63, 69 70, 71	17, 28, 30 40, 63, 69 70, 71, 104	38, 42, 63 69, 70, 71 104	17, 28, 30 40, 63, 69 70, 71, 104

<sup>1</sup> Viewpoint locations are shown in Figure 3-13. Visual Simulations from Viewpoints 1 through 10 are also shown in Appendix E, Figures E-2 through E-11.

Source: J. Short, 2003

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## Cumulative Effects

### Activities of Other Landowners

Significant changes to the existing landscape on Gravina Island could be caused by the activities of other landowners. The most significant impact would be from the potential harvest of Alaska Mental Health Trust lands that cover the steep forested slopes north of the airport and directly face the Tongass Narrows (see Figure 1-1). This terrain forms a very scenic and prominent backdrop visible from many residential neighborhoods along the North Tongass Highway. Two specific harvest areas have been identified on the Mental Health Trust lands that would be accessed from the proposed road system between the interior of the island and the Tongass Narrows. Additional harvestable timber exists on the Ketchikan Gateway Borough and Mental Health Trust lands to the north. Future harvest of these areas would create a visual impact from downtown Ketchikan and areas to the north.

The flatter slopes below the Mental Health Trust lands, including the shoreline along the Narrows, are owned by Ketchikan Gateway Borough and individual private landowners. The major impacts to these areas in the future will probably be heavy industrial development along the shore between the airport and the area roughly opposite Ward Cove. There are already two major industrial developments (the Ketchikan International Airport, and Pacific Log and Lumber mill) along this shoreline that have significantly altered the natural character of the Tongass Narrows west shoreline.

Around Vallenar Bay are lands owned by the Alaska Department of Natural Resources (DNR) that may be scheduled for future timber harvest. Most of the potential harvest areas are on the low, rolling terrain between Vallenar Bay and Clarence Strait. Although this harvest would cover much of this peninsula, its visibility would be somewhat minimized by the gentle to flat slopes of this terrain. Much of the immediate shore of this bay consists of existing or future residential lots. In the future, this shore could be altered by scattered residential dwellings and the associated development that traditionally accompanies private residences, such as docks, ramps, other small buildings, and vegetative clearing.

At the head of Bostwick Creek are additional DNR forest lands that are planned for future harvest. This harvest would be slightly visible from the head of Bostwick Inlet.

In the Gravina Access Project Draft EIS, the preferred alternative includes constructing a bridge to cross the Tongass Narrows at a point just south of the city of Ketchikan. This bridge would have major impacts to the near-natural backdrop of Pennock and Gravina Islands, as seen from the downtown area looking to the southwest.

The following viewsheds would be affected by these developments on non-National Forest System lands:

*Downtown Ketchikan and residential areas (VP 1):* The views from these areas would be further impacted by harvest of Mental Health Trust lands above the north end of the airport runway. This harvest would be seen in combination with Unit 5, and would meet no more than a Modification VQO. The views to the south from downtown would also be dominated by the Gravina Access Project bridge. The bridge would significantly alter the near-natural visual condition (except for scattered beach homes) of Pennock and Gravina Islands.

*Residential areas along South Tongass to Mountain Point (VP 2):* From some locations along South Tongass, the Gravina Access Project bridge would impact the view of Pennock and Gravina Islands.

*Bostwick Inlet (VP 4, 5, 6):* Harvest of DNR lands around the head of Bostwick Creek would be visible at an oblique angle from the head of Bostwick Inlet and would add slightly to the impact of the National Forest System land harvest.

*Deer Mountain (VP 12):* Harvest of Mental Health Trust lands and DNR lands above the airport runway would be clearly visible from Deer Mountain and would moderately impact the view. Harvest of DNR lands near the head of Bostwick Creek would be slightly visible. The



Gravina Access Project bridge would be clearly visible from Deer Mountain and would significantly impact the views of Pennock and Gravina Island.

## Geology, Minerals, and Karst

This section provides a view of the geology, mineral, and karst resources of the Gravina project area. Key elements of these geologic features are the lithology (character of a rock formation) and structures that control the mineral deposition and development of the karst lands of the region.

### Affected Environment

#### Geomorphic and Geologic Setting

Gravina Island is characterized by two major ridge systems that run from north to south for the length of the island. These mountains are separated by a fault zone that extends north to south from Vallenar Bay to Bostwick Inlet (Figure 3-14). The general slopes of the landforms on Gravina Island face either southwest (towards Clarence Strait) or northeast (toward Tongass Narrows). The mountains have been smoothed and sheared by the continental ice sheets moving down Clarence Strait, as well as coalescing alpine glaciers. Glacially modified landforms are numerous, including rounded mountains with hanging valleys and steep side slopes, broad U-shaped valleys, bedrock-scoured fault lines, and coastal lowlands. Glacial deposits cover the Vallenar Bay-Bostwick Inlet fault zone-valley. Some of these may represent uplifted marine sediments that rose with the retreat of the last glaciers some 13,500 years ago.

Two geologically distinct bedrock terranes are separated by the Vallenar Bay-Bostwick Inlet fault zone. The bedrock northeast of the fault consists mainly of andesitic metavolcanic and metasedimentary rocks. These rocks have been folded and dip moderately northeastward. The bedrock southwest of the fault consists of interbedded volcanic and sedimentary rocks, including basaltic volcanic rocks, limestone, siltstone, conglomerate, grit, and sandstone. These rocks have been highly folded and faulted and generally dip to the north (Berg, 1973).

The mountains receive moderately high amounts of precipitation through storms funneling up Clarence Strait and the orographic lift of moist, marine air. Lakes are common in the alpine basins. Streams change their character in accordance to landform, with highly contained streams occurring where there is bedrock control. Gradient and containment lessens where streams reach valleys and coastal lowlands.

Rocky, shallow soils have developed from weathered bedrock on upper slopes and ridgetops. Colluvial soils have developed on lower slopes whereas organic and till soils reside on lowlands. Forest productivity changes with drainage, with productive hemlock-spruce forests occurring on well-drained slopes and low productive mixed conifer and lodgepole stands on poorly drained sites. A sizeable portion of the area is nonforested.

#### Minerals and Mining Claims

During field investigations in 1992, the U. S. Bureau of Mines (now Bureau of Land Management), located at least 24 known mineral occurrences, mines, or prospects within the project area (Bittenbender et al. 1993, Maas et al. 1995). These are centralized around old mine workings near Seal Cove and in Dall and Nehenta Bays and are associated with copper mineralization, which occurs as disseminated sulfides in metasedimentary and metavolcanic rocks associated with fault zones.

The old mines are on two patented mining claims (private land); the old prospects occur on National Forest System lands. These mines and prospects were worked from 1899 to 1915 and yielded little. The prospects and old workings have been explored from time to time but have not produced (Roppel, 1991). Bureau of Land Management records indicate that all mining claims within the project area are inactive.

#### Karst Resources

Karst is a comprehensive term that applies to the unique topography, surface and subsurface drainage systems, and landforms formed by the action of water on soluble rock (carbonate,

marble, limestone, and dolomite). The dissolution of the rock results in the development of internal drainage, producing sinking streams (streams that sink into the stream bed or karst features), closed depressions, and other solutional landforms such as sinkholes, collapsed channels, and caves (White et al. 1995). The geology and climate of Southeast Alaska are particularly favorable for karst development. Extensive areas of very pure carbonate, approximately 515,000 acres, are found within the boundaries of the Tongass National Forest. Because of the highly fractured nature of the carbonates, high annual precipitation, and peatlands proximal to the carbonate bedrock, karst has developed, to one extent or another, within all carbonate blocks. The Tongass National Forest contains the largest known concentration of dissolution caves in Alaska.

The carbonate outcrops within the project area were mapped in detail by the Forest geologist and a contracted geologist working for Harza Engineering Co. The harvest units planned on top of or adjacent to the carbonates were inventoried by the Forest geologist and the soil scientist. (A detailed report of the inventory results is in the project planning record.) The geologic map for the project area was modified to reflect the field reconnaissance and the geology mapped by the USGS (Berg, 1973). Approximately 4,520 acres of karst have been mapped in the project area (Table 3-33). All these karst lands occur west of the Vallenar Bay-Bostwick Inlet fault zone (Figure 3-14).

No past timber harvest or road construction has occurred on karst land on National Forest System lands in the project area.

No karst-developed caves were found adjacent to or within the proposed harvest units. Several talus caves were located within metarhyolite rock. These caves were reported by members of the Glacier Grotto to the Forest Service during project scoping. One of these caves had over 50 feet of narrow passage and formed behind a slab of bedrock slumped off the cliff face near the eastern boundary of Unit 89. No talus caves were found within any of the project area units, however.

## Karst Management

The three-dimensional landform of karst lands imposes special land management challenges. Recognizing this, the Tongass National Forest incorporated Karst Management Standards and Guidelines into the Forest Plan (pp. 4-18 to 4-20, and Appendix I). These Standards and Guidelines categorize karst areas by their vulnerability to being adversely affected by management activities. The differences in vulnerability or sensitivity of a particular system are typically a function of the extent of karst development, the openness of the karst system, and the sensitivity of other resources that benefit from the karst groundwater systems. Only those areas within and adjacent to proposed harvest units were inventoried. The vulnerability of the remaining carbonate outcrops remains undetermined (Table 3-33).

**Low Vulnerability:** These carbonate areas have been modified by glaciation, are highly weathered, or show limited karst development. Within the project area, they generally occupy the lower third of the glacial valleys, and have a deep (over 40 inches) covering of glacial till with limited epikarst showing. Surface drainages may be present. Low-vulnerability karst lands have no karst-specific management restrictions.

Low-vulnerability karst lands were mapped in Units 17, 74, 75, 77, 80, 81, and 89. Unit 89 was visited by the Forest Geologist. A few isolated outcrops in streambeds suggest this unit is underlain by the carbonaceous shale and thin-bedded limestone of the Nehenta Formation. No karst development was observed but the potential exists for limited development.

Units 17, 74, 75, 77, 80, and 81 were not visited by the Forest Geologist. They were visited by other resource specialists and no karst resource concerns were noted. During the summer of 2003, the Forest Geologist spent a week mapping similar strata near Phocena Bay, Nahenta Bay, and Bostwick Inlet, adjacent to these units. Although the geologic strata that underlies these units contains minor thin-bedded carbonaceous limestone, no karst development was noted. The strata primarily consist of carbonaceous shale, thin limestone debris flows, and sandstone, and conglomerate. Based on the mapping of Berg (1973), field reconnaissance



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during the 2003 field season, and karst surveys of Unit 89, it was determined that karst development was unlikely in these units. No karst development was noted in Unit 17 by the soils review; the "shist" of "phyllite" noted in the soils report is most likely the shale member of the Nahenta Formation. Given that a small portion of the strata is calcareous, a designation of low vulnerability was given to these units.

**Moderate Vulnerability:** Epikarst development is shallow to non-existent on the steeper slopes and is sometimes visible at the surface. Water tends to flow along regional fracture systems which are now stream valleys and along the bedrock/soil interface on the steeper slopes (i.e. 50-90 percent). They tend to be on the upper two thirds of the valley slopes. These carbonate areas have a mosaic of shallow organic soils (10-20 percent, McGilvery soils) and mineral soils (80-90 percent, Sarkar (<20-inch depth) and Ulloa (> 20-inch depth) soils) with minor amounts of glacial till. The surface of the limestone has been solution modified after glaciation. These lands are unlikely to introduce organic sediment and debris into the underlying karst hydrologic systems. Partial-suspension harvest systems are required to minimize soil disturbance.

Proposed harvest Units 88, 90, 91, 92, 93, and portions of Units 107 and 108 are underlain by moderate-vulnerability karst lands. They are underlain by carbonate, also interbedded metarhyolite, carbonaceous siltstone and limestone, a light-gray slaty limestone, and/or a chert pebble conglomerate; the light-gray slaty limestone is the dominant type. Slopes adjacent to and within these harvest units range from 30-90 percent.

**High Vulnerability:** These features include all collapsed karst features, caves, losing streams and resurgences, and the small, high-gradient watersheds that flow into these features. These features can move organics, sediments, and debris down very rapidly into the underlying karst hydrologic systems if disturbed. The entrance area surrounding resurgences should be protected to maintain the quality of the water flowing from them. Also considered high vulnerability are karst lands in which the epikarst is well- or extremely well-developed, with predominately very shallow organic and mineral soils. High-vulnerability karst land is considered unsuitable for timber management and is removed from the suitable land base.

In one small area, approximately 4 acres in the westernmost corner of proposed Unit 108, slopes drop to less than 10 percent. In this area, the surface drainage goes subsurface and several collapse features are present. One large collapse feature (estimated at 70 ft. x 40 ft. x 20 ft. deep) can be found on this topographic flat. Springs surfacing from the upslope bedrock/soil interface sink into this feature. This 4-acre area has been removed from consideration for timber harvest under all action alternatives.

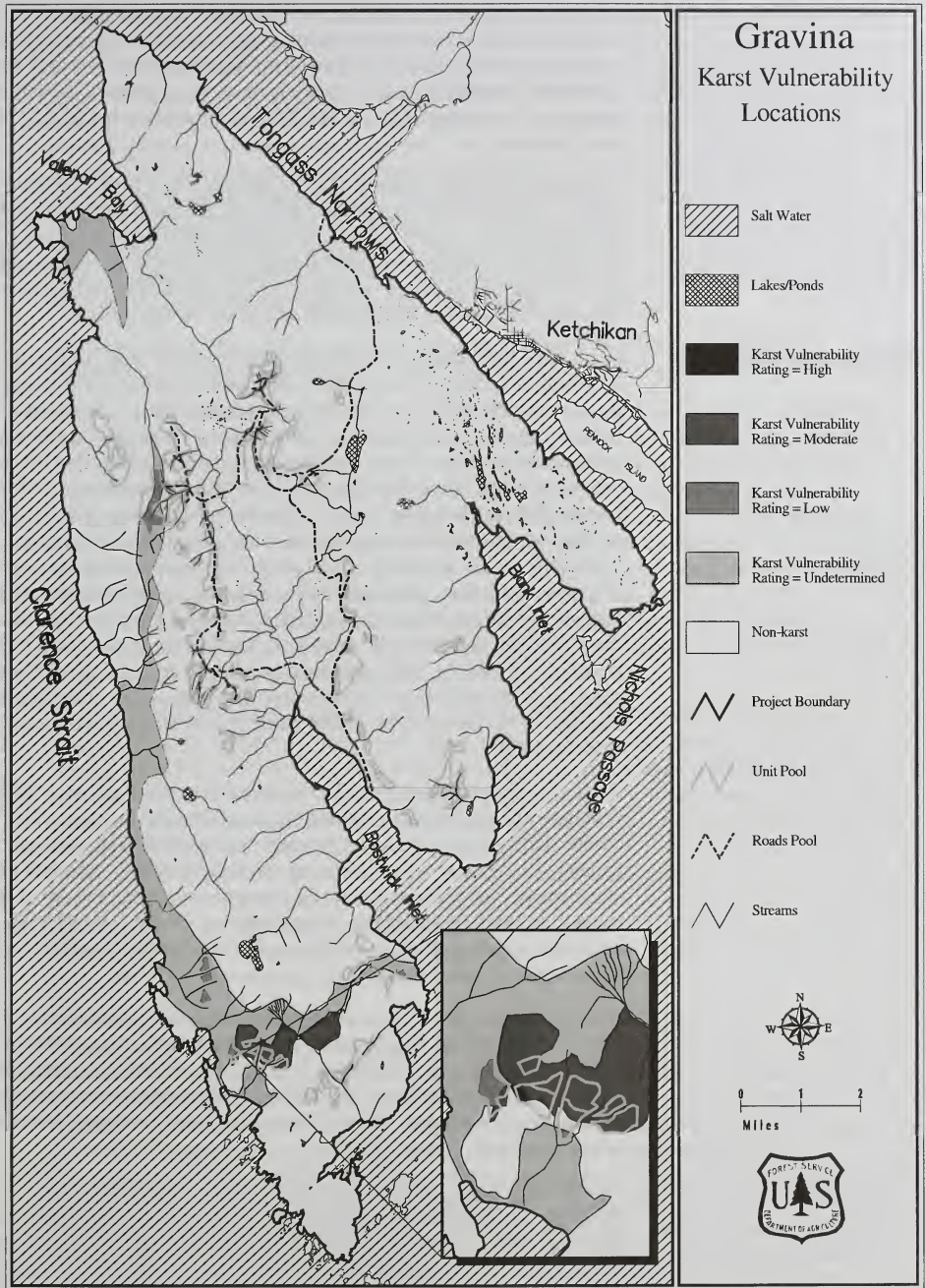
No tracer dye studies were conducted within the inventoried areas. Streams flowed on the surface across most of the low and moderate-vulnerability karst lands. The one sink feature identified accepted surface drainage. Springs directly below this sink and outside of any proposed harvest is believed to be connected to this karst feature.

Table 3-33  
Low, Medium and High-Vulnerability Karst within the Gravina Project Area

	Vulnerability Undetermined	Low Vulnerability	Moderate Vulnerability	High Vulnerability	Total Acres Karst
Non-NFS acres	547	0	0	0	547
Project Area (NFS) acres	3,243	375	351	4	3,973
<b>Total Acres</b>	<b>3,790</b>	<b>375</b>	<b>351</b>	<b>4</b>	<b>4,520</b>

Source: A. Grundy, GIS, 2003

Figure 3-14  
Karst Areas in the Gravina Island Project Area



AML/f5/files/unit/km/timber/personal/al/am/gkval811.aml

MAP/f5/files/office/gis/gravina/covers/karst/gkval811.eps

January 23, 2004 A. Grundy modified by C. Rose

Source: A. Grundy, 2003



## Environmental Consequences

### Effects on Minerals

Implementation of any of the action alternatives would have no direct impacts on mineral resources. In general, where the roads are left open, the project would affect mining activities by providing easier access for mapping and surveying less-developed areas. Though these new roads are not in the historic mining districts, the potential for new discoveries exist with the disturbance generated by new road construction and associated activities. Geologic mapping would also be enhanced by increased exposure of rock due to road construction and quarry development.

The chemically pure carbonates of Alaska have long been considered for their commodity values. Values are not determined solely on chemical purity but on brightness as well. The more pure the carbonate bedrock, the more intense karst development may be. The impacts of any proposed mineral development within the karst landscape would be analyzed once a plan of operation was received. However, on karst lands found to be of unquestionably high vulnerability, mineral development would not be appropriate.

### Effects on Karst

Karst lands have separate issues and concerns from other landforms because karst is a three-dimensional landform with closely integrated surface and subsurface processes. Groundwater flows relatively slowly through porous rock and soil, or via fracture flow, in non-karst terrain. In karst terrain, groundwater may flow relatively quickly through complex underground systems of solution-widened conduits that vary from fissures a few inches wide to cave systems many feet wide. Threats to karst systems and caves and associated drainages, from timber harvest and road building, include a change in hydrology, infiltration rates, sediment production, debris transport, pollutants, and introduction of organics that can lead to oxygen depletion. Issues and concerns related to karst lands primarily revolve around potential change of groundwater flow in the underground system. Any management activity that causes sediment or organic debris to build up in the subsurface conduits decreases the capacity of these conduits and makes it more likely that surface streams will form. Similarly, any management activity that increases groundwater recharge may also affect the capacity of the conduits in the underground system and make formation of surface streams more likely. Changes in the presence of surface water produces broad ecosystem changes both above and below ground.

Groundwater recharge in karst lands occurs by either discrete or diffuse recharge. Discrete recharge refers to losing or sinking streams that enter the subsurface at specific resurgence points. Diffuse recharge refers to subsurface entry of water through the forest floor and the epikarst. Losing or sinking streams can rapidly deliver sediment into subsurface passageways. Because of the purity of these carbonates, the dip of the beds in relation to the slopes, the shallowness of the epikarst, and the glacial history, limited subsurface flow is expected. Most surface waters flow across the slopes collecting as streams in the draws formed along regional fractures.

All of the action alternatives are expected to result in a small initial increase in water yield after harvest. Removal of vegetation by timber harvesting can initially increase recharge and alter the water balance in a watershed. Precipitation, evaporation, transpiration and storage are the major factors in evaluating water balance. The removal of the forest canopy alters both evaporation and transpiration rates, resulting in an increase in water available for surface or subsurface flow.

Precipitation falling on the forest canopy reaches the forest floor by throughfall, dripfall, or stemflow. Precipitation intercepted by the canopy is evaporated back into the atmosphere and does not reach the ground surface. Nowacki and Kramer (1998) found that canopy throughfall in Southeast Alaska ranged between 20 percent and 80 percent of gross precipitation and averaged approximately 50 percent. Because of the rapid natural revegetation in the Gravina



project area, the limited size, and partial harvest prescription of the proposed harvest areas, forest harvest is not expected to have significant long-term effects on water yield.

Sediment transport into karst systems has been an issue elsewhere because of the effects of past forest practices. Sediment or contamination transported from roads and disturbed lands have emerged at distant springs, even across surface watershed boundaries. Sediment and organic debris have been deposited in the underground conduits and cave passages blocking entry to these passageways and restricting groundwater flow. Partial or complete blockage of diffuse recharge pathways by sediment or logging debris has altered infiltration rates and caused surface streams to appear in drainages that were previously dry except during very high rainfall events. Blockage of underground stream passages has restricted subsurface flow, causing flooding passages and surface areas. Streams that once flowed underground now meander across the surface searching out a flow path and excavating surface channels. This is attributed to the size of past harvest blocks and the rate at which the landscape was harvested. The initial flush of sediment and debris immediately after harvest with the first storm cycles is believed to have delivered the majority of the material into the karst systems.

Partial cutting, reduced harvest unit size, logging systems that achieve at least partial suspension, and longer metering of the acres harvested per decade lessen these effects.

## Mitigation

A karst resource assessment was used to plan timber harvest on the karst lands. Forest Plan Standards and Guidelines, best management practices (BMPs), and project design mitigation included on unit cards have been used to minimize adverse effects to karst resources in the analysis area. Under the Standards and Guidelines, no harvest would occur on high-vulnerability karst lands under any alternative. Specific drainages that flow into identified karst features would also be protected. The remaining acres of karst in the vicinity of proposed timber harvest are characterized as moderate vulnerability. From the original unit pool for the Gravina project, no units were dropped to avoid impacts to forest resources. In the westernmost portion of proposed harvest Unit 108, 4 acres have been removed from consideration for timber harvest under all action alternatives. The area surrounding the talus caves has also been excluded from proposed harvest Unit 89.

Portions of harvest Units 90 and 91 contain slopes in excess of 72 percent. Forest-wide Standards and Guidelines for Karst and Cave Resource Management in the Tongass Land Management Plan (Forest Plan, Appendix I) do not allow for harvest on slopes greater than 72 percent. This standard was intended to protect those areas where shallow organic soils were dominant in the bench and cliff areas of carbonate. In the Tongass National Forest Land and Resource Management Plan Implementation Policy Clarification (TPIT), August 1998, the issue of harvest on slopes greater than 72 percent is discussed. Because of the limited karst development and the presence of mineral, organic, and glacial soils across the slopes, it is the opinion of the Forest geologist that this standard does not apply in this instance. The soil scientist, in accordance with Soil Standards, BMPs and the TPIT clarification, determined the appropriateness of harvest on these slopes.

When karst features are reserved from harvest, the effect is to enlarge the buffers around these features. As buffers around karst features are enlarged, the potential for unforeseen adverse impacts from disturbance is reduced. High-vulnerability karst blocks, cave systems, losing streams, and individual features were buffered to maintain their integrity and biological function. Traditional buffers of 100 feet beyond the slope break surrounding a feature were modified to include an unspecified distance to provide a "reasonable assurance of windfirmness" (RAW) buffer. A distance of two tree heights was applied as a minimum RAW buffer. No dye traces were conducted in the project area due to the nature of the carbonate outcrops. Streams that sink along the margin of these outcrops either resurface a short distance downslope, becoming surface streams on the adjacent lithologies or stay within the outcrop, reappearing as springs downslope. Because of these relatively simple karst groundwater systems, it was determined that dye tracer studies were not needed. Potentially adverse effects on karst are limited to initial increases in water and sediment yield immediately after logging.

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#### Direct and Indirect Effects

It was determined that the moderate-vulnerability areas would be suitable for timber harvest with partial suspension is required to minimize soil disturbance. This would be achieved through helicopter yarding. Should the partial harvest areas in the selected units remain windfirm, there should be few threats to the karst systems and features within the project area. These mitigations are specified on the unit cards (Appendix B of the Draft EIS); the need for some requirements would be determined during project layout.

Table 3-34 displays the acres of proposed harvest on low and moderate-vulnerability karst lands, which ranges from 25.7 to 76.5 acres by action alternative. The discussions by alternative, including silvicultural prescriptions and harvest methods, pertain only to units underlain by karst (Units 17, 74, 75, 77, 80, 81, 88, 89, 90, 91, 92, 93, 107, and 108). All of these units utilize helicopter yarding, which exceeds the partial suspension requirements for moderate-vulnerability karst lands. The low-vulnerability karst lands in Units 17, 74, 75, 77, 80, 81, 89 have no karst-specific management restrictions. The 4-acre area of high-vulnerability karst in Unit 108 has been removed from consideration for timber harvest in all action alternatives. No new road construction is proposed across karst in any alternative.

**Table 3-34**  
Effects of the Alternatives on Low and Moderate-vulnerability Karst Lands

Silvicultural Prescription	Harvest on Karst (acres)					
	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
Single-tree Selection	0	97.9	162.8	164.8	164.8	162.8
Group Selection	0	17.1	0	17.1	17.1	0
Two-aged Clearcut w/Reserve	0	152.1	152.1	152.1	35.2	152.1
<b>Total Acres of Harvest on Karst</b>	<b>0</b>	<b>267.1</b>	<b>314.9</b>	<b>334.0</b>	<b>217.1</b>	<b>314.9</b>
Cumulative Percent of Harvest on Karst	0	5.9	7.0	7.4	4.8	7.0

Source: J. Baichtal, GIS, 2003

#### Alternative 1

Timber harvesting and related activities are not proposed as part of Alternative 1. Natural erosion and transport processes, including mass wasting, surface erosion, and stream erosion, would continue. All of these natural processes contribute sediment to karst systems.

#### Alternative 2

Among the action alternatives, Alternative 2 has the second-lowest harvest acreage on carbonate, moderate-vulnerability karst (25.7 acres), and low-vulnerability karst (241.4 acres). No road construction on karst is proposed, and all units located on karst are designed for helicopter yarding. Harvest methods involve single-tree selection (STS) and group selection (GS) not to exceed 2 acres in size retaining 50 to 60 percent, and two-aged clear cut with reserves. The proposed harvest on carbonate rock represents a 5.9 percent increase over total past harvest on carbonate rock (Table 3-34).

#### Alternative 3

Among the action alternatives, Alternative 3, like Alternative 6, has the third-lowest harvest acreage on carbonate rock, moderate-vulnerability karst (59.4 acres), and low-vulnerability karst (255.6 acres). No road construction on karst is proposed, and all units located on karst are designed for helicopter yarding. Harvest methods involve single-tree selection (STS) and group selection (GS) not to exceed 2 acres in size retaining 50 to 60 percent, and two-aged clearcut with reserves. The proposed harvest on carbonate rock represents a 7.0 percent increase over total past harvest on carbonate rock (Table 3-34).

## **Alternative 4**

Among the action alternatives, Alternative 4 has the highest harvest acreage on carbonate rock, moderate-vulnerability karst (76.4 acres), and low-vulnerability karst (257.6 acres). No road construction on karst is proposed, and all units located on karst are designed for helicopter yarding. Harvest methods involve single-tree selection (STS) and group selection (GS) not to exceed 2 acres in size retaining 50 to 60 percent, and two-aged clearcut with reserves. The proposed harvest on carbonate rock represents a 7.4 percent increase over total past harvest on carbonate rock (Table 3-34).

## **Alternative 5**

Among the action alternatives, Alternative 5 has the lowest harvest acreage on carbonate rock, moderate-vulnerability karst (76.4 acres) and low-vulnerability karst (140.7 acres). No road construction is proposed in this alternative, and all units are designed for helicopter yarding. Harvest methods involve single-tree selection (STS) and group selection (GS) not to exceed 2 acres in size retaining 50 to 60 percent, and two-aged clearcut with reserves. The proposed harvest on carbonate rock represents a 4.8 percent increase over total past harvest on carbonate rock (Table 3-34).

## **Alternative 6**

Among the action alternatives, Alternative 6, like Alternative 3, has the third-lowest harvest acreage on carbonate rock, moderate-vulnerability karst (255.6 acres), and low-vulnerability karst (59.4 acres). No road construction on karst is proposed, and all units located on karst are designed for helicopter yarding. Harvest methods involve single-tree selection (STS) and group selection (GS) not to exceed 2 acres in size retaining 50 to 60 percent, and two-aged clearcut with reserves. The proposed harvest on carbonate rock represents a 7.0 percent increase over total past harvest on carbonate rock (Table 3-34).

## **Cumulative Effects**

According to GIS analysis, there are approximately 547 acres of karst on non-National Forest System lands on Gravina Island (Table 3-33), all in the vicinity of Vallenar Bay. The vulnerability of these karst lands is undetermined. There is no high-vulnerability karst known on private land. Alaska Department of Natural Resources plans to harvest state lands in the Vallenar Bay area, and a portion of this harvest may occur on karst.



## Soils

This section reviews the existing information on the Gravina Island project area for management of soils, including soil productivity, mass movement erosion, and surface erosion. Information from the Forest Service's GIS database, aerial photography, and field surveys of the project area were used. A Forest-wide treatment of soils may be found in the Forest Plan Final EIS, Chapter 3, and the Forest Plan, Chapter 4 and Appendix C. The unit and road cards (Appendix B in the Draft EIS) contain additional site-specific mitigation for implementation.

## Affected Environment

Soil development in Southeast Alaska is influenced by high levels of rainfall, cool maritime temperatures, and moderately low annual soil temperatures. Under these conditions, organic material decomposes slowly, resulting in thick surface layers of organic soil. Windthrow, flooding, and landslides are important types of natural disturbance that alter the soil properties. In general, parent material, topography, vegetation, animals, and climate influence soil features that affect and are affected by timber harvest activities. Soils influence vegetation composition, water quality, riparian area, and wetland values, and the productivity of timber and fish, and indirectly affect wildlife in the Gravina Island project area.

### Soil Productivity

Soil productivity is defined as the capacity of the soil to support plants, due to the soil's inherent chemical, physical, and biological properties. Road construction and rock pit development remove forest soils from timber production. Although specified roads are exempt from counting as a negative impact on soil productivity, sidecast materials and other materials involved in road building are not. Sidecast materials and overblasted rock affect soil productivity because they either cover or remove the topsoil, rendering it unproductive.

Approximately 3.0 miles of road were constructed near Vallenar Bay for timber harvest that took place in the 1950s. This road is now closed and revegetated with alder. The existing road on Gravina Island (approximately 1.8 miles) is associated with the airport on the east side of the island. None of the existing road is on National Forest System lands. No landslides are associated with existing roads.

### Soil Loss

#### Mass Movement Erosion

Mass wasting events, also called landslides, are the naturally occurring dominant process of erosion in Southeast Alaska. Landslides can deliver soil, rock, and debris to the aquatic environment. They are most likely to occur along stream banks, snow slide or avalanche slopes, and within V-notches (steep streams deeply incised into the bedrock) (Swanston, 1969). V-notches are located throughout the project area.

Landslides typically occur during or immediately after periods of heavy rainfall, when soils are saturated (Swanston, 1970). Landslides usually occur on steep slopes that have soils with distinct subsurface layers such as compact glacial till or bedrock that slopes parallel to the ground surface. These parallel subsurface layers form a smooth slip-plane on which slides occur (Bishop and Stevens, 1964).

Vegetation, particularly tree roots, has a stabilizing effect on slopes. Maximum loss of rooting strength occurs 3 to 5 years after a tree is cut, resulting in a reduction in soil shear strength (Swanston and Walkotten, 1969). This reduction of soil shear strength results in an increased likelihood of landslides on steep slopes following clearcutting. Effects of partial cutting on slope stability in Southeast Alaska are largely unknown. Under natural conditions, windthrow is an important triggering device of landslides in Southeast Alaska. Research in Southeast Alaska has suggested that, although less than 10 percent of all landslides in the past 20 years

were related to logging or roads, these activities may increase the potential for landslides in a given area (Swanston, 1991).

Sixty-four landslides were found in a photo-based inventory of Gravina Island. All slides initiated in old-growth stands; none were related to past management activities, although several of the landslides initiated above past harvest in the Vallenar Bay area. Of these mapped landslides, 58 percent occurred on slopes mapped as being between 60 and 100 percent, and 62 percent occurred in shallow soils. A majority (87 percent) of the slides have revegetated with alder or conifer.

The Forest Service uses a Mass Movement Index (MMI) to identify potentially unstable sites in a project area. The MMI is based on slope, bedrock characteristics, as well as the physical properties of a soil including drainage, profile characteristics, and texture. The MMI rates the relative stability of the soil into one of four classes of landslide potential: 1 (low), 2 (medium), 3 (high), and 4 (very high). Some mineral soils that occur on slopes greater than 72 percent gradient, and some mineral soils with restricted drainage on slopes greater than 60 percent gradient, are classified as MMI 4. There are about 2,646 acres of slopes greater than 72 percent on Gravina Island (determined in GIS by using 100-foot contour intervals). Table 3-35 lists acreages of each MMI class for Gravina Island.

**Table 3-35**  
**Mass Movement Index (MMI)<sup>1</sup> Classes on Gravina Island**

	Acres of MMI 1	Acres of MMI 2	Acres of MMI 3	Acres of MMI 4
<b>Gravina Island Acres<sup>2</sup></b>	39,407	12,921	7,746	878

<sup>1</sup> MMI = mass movement potential. MMI 1 = low, MMI 2 = medium, MMI 3 = high, MMI 4 = very high.

<sup>2</sup> Lakes and ponds (452 acres) are excluded.

Source: A. Grundy, GIS, 2002

## Surface Erosion

Management activities can increase surface erosion through displacement of the protective organic mat. Soil displacement is defined as “the horizontal movement of soil from one place to another by mechanical forces such as a blade, wheel slippage, or dragging logs” (FSM 2554.05). Surface organic layers can be removed by yarding activities, exposing underlying mineral soils to overland flow. Road cuts can intercept the shallow subsurface flow along a hillside and concentrate runoff into ditch lines, which can cause erosion.

## Environmental Consequences

### Effects on Soil Productivity

Road construction and rock pit development remove forest soils from vegetative production. To mitigate negative impacts caused by landing construction and location, BMP 13.10, Log Landing Location and Design, would be used to design and construct landings to minimize soil erosion and water quality degradation (FSH 2509.22). Soil and water resource protection measures would be incorporated into the design of all roads (BMP 14.3, FSH 2509.22). For all alternatives involving the construction of roads, the total loss of soil productivity equals the area occupied by new roads (Table 3-36). We assumed 2.9 acres of disturbance per mile of road, 1.5 rock pits for each mile of road, and 1/2 acre of disturbance for each proposed rock pit within the project area.

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Table 3-36  
Soil Disturbance from Proposed Road and Rock Pit Construction

	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
Acres of disturbance from road construction <sup>1</sup>	0	58.1	64.0	64.5	0	50.5
Acres of disturbance from rock pit development <sup>2</sup>	0	15.0	16.6	16.7	0	13.1
<b>Total Disturbance</b>	<b>0</b>	<b>73.1</b>	<b>80.6</b>	<b>81.2</b>	<b>0</b>	<b>63.6</b>

<sup>1</sup>Assumes 2.9 acres of disturbance per mile of road constructed.

<sup>2</sup>Assumes 1.5 rock pits per mile of construction, and ½ acre of disturbance from each pit.

Source: P. Frohne, 2002, K. O'Connor, 2004

Alternative 4 proposes the most road development of the alternatives; if implemented, Alternative 4 would result in the greatest loss of long-term soil productivity due to road building and rock pit development, followed by Alternatives 3, 2, and 6.

Soil displacement within harvest units can have detrimental impacts to soil productivity. Displacements are considered detrimental when 50 percent of the topsoil (humus-enriched soil) is removed, and the area is larger than 100 square feet and at least 5 feet wide (Region 10 Soil Quality Standards). Region 10 Soil Quality Standards require that a minimum of 85 percent of an area is left in a condition of acceptable productivity for trees. Classified (system) roads, including cut, fill, road bed, landings and log transfer facilities are not counted towards this area, but temporary (spur) roads and sidecast material are included (Region 10 Soil Quality Standards).

Landwehr and Nowacki (1999) conducted a statistical review of soil disturbance transect data. In 56 harvest units, total disturbance (non-detrimental and detrimental) was 4.8 percent with shovel yarding, 5.7 percent with partial suspension, and 2.6 percent with full suspension. On steep slopes (greater than 75 percent slope), an inventory of 23 steep slope harvest units found 6.4 percent total disturbance with partial suspension, and 2.9 percent total disturbance (non-detrimental and detrimental) with full suspension. Since Forest Plan Standards and Guidelines have been found to be effective in minimizing soil disturbance, detrimental soil displacement is not likely to occur under any of the action alternatives.

#### Effects on Soil Loss

##### Mass Movement Erosion

Timber harvest can induce slumping in the inner gorges of V-notches (steep streams deeply incised into the bedrock) through the removal of protective vegetation. This effect would be minimized by applying no-harvest buffers to at least the topographic slope break above Class III streams, directional felling, and by using harvest systems that yard the timber away from streams.

Landslides are most likely to occur when timber is harvested or roads are constructed on landscapes with very high mass movement indices (MMI 4). Landslides are less likely in areas with a lower MMI rating (MMI 1-3). A minor degree of site disturbance is unavoidable under any timber harvest activity. No roads or timber harvest is planned under any action alternative on MMI4 soils.

Potential harvest units with slopes greater than 72 percent were field reviewed by a soil scientist according to Forest Plan Standards and Guidelines. Highly unstable areas were excluded from harvest. In some cases, the soil scientist identified slopes greater than 72 percent that are appropriate for timber harvest due to lower-than-MM1 4 landslide potential. In most harvest units, slopes exceeding 72 percent are short pitches adjacent to cliffs or rock outcrops, and do not present a high risk for mass movement.



Table 3-37 displays the acres of timber harvest proposed on slopes greater than 72 percent; these acreages were determined in the field. See the Unit Cards, Appendix B of the Draft EIS, for a site-specific description of the concerns associated with the harvest units.

**Table 3-37**  
**Proposed Timber Harvest Activities on Slopes Exceeding 72 Percent**

Proposed Activity on NFS Land	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
Total acres of timber harvest	0	1,801	1,818	2,218	803	1,562
Acres of harvest on slopes exceeding 72 percent <sup>1</sup>	0	96	110	120	63	107
Percent of harvest on slopes exceeding 72 percent	0	5%	6%	5%	8%	7%

<sup>1</sup>This number is a summed total of estimates of slopes greater than 72 percent taken during field visits of individual units. See the Unit Cards in Appendix B for site-specific acreages of harvest on slopes exceeding 72 percent.  
Source: P. Frohne, 2002

## Surface Erosion

While surface erosion is not a problem in the project area, sediment can be delivered to streams at road crossings. Short-term effects are associated with road construction activity, and long-term effects are produced by the erosion of road surfaces and cut-and-fill slopes.

Sediment transport from road construction activities would be minimized with erosion control measures and BMPs. Long-term erosion of the road prism and associated cut-and-fill slopes would be addressed by post-construction BMPs, which include revegetation, road maintenance, and road closure (pulling culverts and reseeding the road bed—see the Transportation section of this chapter for more information).

## Direct and Indirect Effects

### Alternative 1

Under Alternative 1 (No Action) no additional sediment sources or transport pathways would be created.

### Alternative 2

The direct and indirect effects of Alternative 2 pose the fourth-highest risk, of the action alternatives, to soil resources. About 96 acres of slopes greater than 72 percent would be harvested, and 73.1 acres would be lost due to conversion to road or rock pits.

### Alternative 3

The direct and indirect effects of Alternative 3 pose the second-highest risk to soil resources. About 110 acres of slopes greater than 72 percent would be harvested, and 80.6 acres would be lost due to conversion to road or rock pits.

### Alternative 4

The direct and indirect effects of Alternative 4 pose the highest risk to soil resources. Proposed activities would occur on 120 acres of slopes greater than 72 percent, and 81.2 acres would be lost due to conversion to road or rock pits.

### Alternative 5

The direct and indirect effects of Alternative 5 pose the lowest risk of the action alternatives to soil resources. About 63 acres of slopes greater than 72 percent would be harvested. No soil would be lost to road building since no road building is proposed under this alternative.

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## Alternative 6

The direct and indirect effects of Alternative 6 pose the third-highest risk of the action alternatives to soil resources. About 107 acres of slopes greater than 72 percent would be harvested, and 63.6 acres would be lost due to conversion to road or rock pits.

## Cumulative Effects

The soil scientist used photo interpretation and ground reconnaissance to evaluate potential effects of the action alternatives. Best Management Practices (BMPs) are intended to minimize surface erosion and mass wasting. Soil protection mitigation measures and BMPs are listed on the unit and road cards (Appendix B of the Draft EIS).

The potential cumulative soil disturbance from road construction and rock pit development on National Forest System lands and other ownerships is greatest under Alternative 4 (Table 3-38). Alternative 2 has the second-highest soil disturbance potential, followed by Alternatives 3 and 6. Alternative 5 has no soil disturbance associated with it, since there is no road construction proposed under this alternative.

**Table 3-38**  
Cumulative Soil Disturbance from Road and Rockpit Construction on Gravina Island

Soil Disturbance (acres)	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
Total disturbance from past road construction <sup>1,3</sup>	13.9	13.9	13.9	13.9	13.9	13.9
Total disturbance from past rock pit development <sup>1,4</sup>	3.6	3.6	3.6	3.6	3.6	3.6
Potential disturbance on non-NFS lands from road construction <sup>2,3</sup>	67.0	67.0	56.0	56.0	67.0	56.0
Potential disturbance on non-NFS lands from rock pit development <sup>2,4</sup>	17.3	17.3	14.5	14.5	17.3	14.5
Potential disturbance on NFS lands <sup>5</sup>	0	73.1	80.6	81.2	0	63.6
<b>Total Soil Disturbance (acres)</b>	<b>101.8</b>	<b>174.9</b>	<b>168.6</b>	<b>169.2</b>	<b>101.8</b>	<b>151.6</b>

<sup>1</sup> Based on approximately 4.8 miles of closed and existing road on all ownerships.

<sup>2</sup> See Table 3-21 in the Transportation section for road mileages.

<sup>3</sup> Assumes 2.9 acres per mile of road construction.

<sup>4</sup> Assumes 1.5 rock pits per mile of road construction and one half acre of disturbance from each rock pit.

<sup>5</sup> See Table 3-36.

Source: P. Frohne, 2002, K. O'Connor, 2004

The cumulative acreage of harvest on slopes exceeding 72 percent would be greatest in Alternative 4, followed by Alternatives 3, 6, 2 and 5 (Table 3-39). It was assumed that approximately 8 percent of the timber harvest that may occur on other ownerships would be on slopes greater than 72 percent.

**Table 3-39**  
Cumulative Timber Harvest on Slopes Exceeding 72 Percent on Gravina Island

Proposed Activity (acres)	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
Acres of past harvest on slopes exceeding 72 percent <sup>1,2</sup>	84	84	84	84	84	84
Acres of potential harvest on slopes exceeding 72 percent on other ownerships <sup>1,3</sup>	90	90	90	90	90	90
Acres of proposed harvest on slopes exceeding 72 percent on NFS lands <sup>4</sup>	0	96	110	120	63	107
<b>Total Potential Harvest on Slopes Exceeding 72 Percent (acres)</b>	<b>174</b>	<b>270</b>	<b>284</b>	<b>294</b>	<b>237</b>	<b>281</b>

<sup>1</sup>This analysis assumes that 8 percent of harvest occurring on other ownerships would be on slopes exceeding 72 percent. Since no road construction or timber harvest on MMI 4 soils is occurring on National Forest land, the same is assumed for other ownerships.

<sup>2</sup>Based on 1,047 acres of previous harvest.

<sup>3</sup>Based on 1,119 acres of potential harvest on other ownerships.

<sup>4</sup>This number is a summed total of estimates of slopes greater than 72 percent taken during field visits of individual units. See the Unit Cards in Appendix B of the Draft EIS for site-specific acreages of harvest on slopes exceeding 72 percent.

Source: P. Frohne, 2002, K. O'Connor, 2004



## Wetlands and Floodplains

This section reviews the existing information on the Gravina Island project area for management of wetlands. Information from the Forest Service's GIS database, and field surveys of the project area were used. A Forest-wide treatment of wetlands may be found in the Water section of the Forest Plan Final EIS, Chapter 3, and the Forest Plan, Chapter 4. The unit and road cards (Appendix B in the Draft EIS) contain additional site-specific mitigation measures for implementation.

## Affected Environment

Wetlands are defined as: "those areas that are inundated or saturated by surface or groundwater with a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions" (40 CFR 230.41(a)(1)). Identification of wetlands is based on the Corps of Engineers three-parameter system described in U.S. Army Corps of Engineers Wetlands Delineation Manual (COE 1987). Wetlands are identified as areas having hydric soils, hydrophytic vegetation, and wetland hydrology. Soil resource inventory maps, including correlations between soil series and plant communities, were used to determine the extent of wetlands in the project area. Hydrologic parameters are inferred from the soil moisture regime.

Using this wetland definition and delineation method, approximately 71 percent (43,568 acres) of Gravina Island is classified as wetlands (Table 3-40).

Wetlands provide various ecological functions, including surface flow and groundwater regulation, sediment retention, nutrient storage, and temperature moderation. They provide terrestrial, aquatic and marine wildlife habitats, biological diversity, and wood fiber. Wetland areas also provide socio-economic benefits, which include areas for wildlife viewing, hunting and recreation, habitat for commercial fishing (salmon) stocks, development sites (such as buildings and roads), community water supplies, and timber harvesting.

### Wetland Types

Eight broad types of wetlands occur on the project area. These wetland types have different soil and vegetative communities, occupy different landscape positions, and have somewhat different functions and values.

**Muskeg** – Bogs (commonly called muskegs) are dominated by sphagnum moss with a wide variety of other plants adapted to very wet, acidic, organic soils. They typically contain some stunted lodgepole pine and hemlock trees. This wetland type includes raised bogs, sloping "poor fens," and some shrub-scrub coniferous wetlands. Muskegs function as areas of groundwater recharge and streams and for deposition and storage of sediment and nutrients, and provide biological and vegetative diversity in the landscape. Muskegs are most commonly found in broad valley bottoms, on rounded hilltops and on rolling lowlands in the project area.

**Lakes and Ponds** – This wetland type consists of open freshwater on a variety of scales, from small ponds that are widespread throughout the project area, particularly in muskegs on the eastern side of Gravina Island south of the airport, to relatively large lakes. Many lakes and ponds in the project area are considered "deepwater aquatic habitat" if they are deeper than 6.6 feet. Lakes and ponds provide habitat for wildlife, including waterfowl, furbearers and coho salmon in Bostwick Lake and the ponds below it.

**Alpine/Subalpine Muskeg** – This type is a combination of muskeg and sedge meadows on peat deposits, and low-growing blueberry and heath on higher rises. Stunted lodgepole pine and mountain hemlock are common. These wetlands are important for snow storage and can be a source of snowmelt water throughout the summer. They also provide summer habitat for

terrestrial wildlife species. These wetlands are located at elevations of 1,200 to 2,500 feet. Many of these habitats in the Gravina Island project area are heavily used during the summer months by deer and bear.

**Sedge Fens** – Fens are diverse communities of sedges, dominated by tall sedges such as Sitka sedge, with a variety of forbs and occasional stunted trees, usually spruce or hemlock. Soils are deep organic muck, often with thin layers of alluvial mineral soil. They occur in landscape positions where they receive some runoff from adjacent slopes, resulting in richer nutrient status than muskegs. These wetlands function as areas for recharge of groundwater and streams, deposition and storage of sediment and nutrients, and as waterfowl and terrestrial wildlife habitat for species such as black bear, mink, river otter, and beaver. Many sedge fens contain beaver ponds that provide high-quality waterfowl and salmon-rearing habitat. On Gravina Island, tall sedge fens are located upstream from estuaries, associated with the mouths of Bostwick and Vallenar Creeks. There are also sedge fens at the headwaters of Government Creek and below High Mountain on the eastern side of Gravina Island.

**Forested Wetlands** – These wetlands typically have hemlock, cedar, or mixed conifer overstories, and ground cover consisting largely of skunk cabbage and deer cabbage. They occur on poorly or very poorly drained hydric soils. They are most common on broad glacial valley bottoms, and on gently sloping hillslopes or benches. These wetlands function as recharge areas for groundwater and streams, and for deposition of sediment and nutrients. They also produce commercial forest products. Forested wetlands are widespread on Gravina Island.

**Estuarine Wetlands** – Estuaries are unique brackish environments where fresh water mixes with saltwater. They are the most valuable wetland in the project area, supporting complex and productive ecosystems for critical fish and wildlife habitat. Estuarine wetlands are of two basic types. Emergent wetlands are characterized by grasses and sedges, especially tufted hairgrass, Lyngby's sedge, and dune wild rye in the upper tidal zone. Common plants on the upper beaches include beach carrot, beach pea, large headed sedge, paintbrushes, and lupine. The other type is the regularly flooded aquatic algal beds on rocky or unconsolidated shore. The largest estuaries on Gravina Island are found where Bostwick Creek enters Bostwick Inlet and Vallenar Creek enters Vallenar Bay. Smaller estuaries are also found along the western shore of Blank Inlet and between South Vallenar Point and Grant Cove.

**Muskeg/Forested Wetland Mosaic** – Small patches of muskegs and forested wetlands can be arranged in a mosaic pattern on the landscape. The vegetation in these types is the same as described above, but function somewhat differently as habitats due to their small size and spatial arrangement.

**Forested Wetland/Upland Mosaic** – Small patches of forested wetland can occur intermixed with forested non-wetland ecosystems. The wetland portion is typically in concave areas within gently sloping or rolling landscapes.

Wetland types that are relatively scarce within the larger landscape may be considered more biologically significant. On Gravina Island, estuaries, sedge fens, and lakes and ponds are the least abundant wetland types (Table 3-40).

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Table 3-40  
Wetland Types on Gravina Island

Wetland Type	Approximate Acres on Gravina Island	Percent of Gravina Island
Alpine/Subalpine Muskeg	3,115	5.1%
Forested Wetlands	14,526	23.7%
Estuarine	44	0.1%
Sedge Fens	1,437	2.3%
Lakes and Ponds	452	0.7%
Muskeg	6,680	10.9%
Muskeg/Forested Wetland Mosaic	11,753	19.1%
Forested Wetland/Upland Mosaic	5,562	9.1%
<b>Total Wetlands</b>	<b>43,568</b>	<b>71%</b>

Source: A. Grundy, GIS, 2002

#### Effects of Past Timber Harvest on Wetlands

Section 404 (f) (1) (A) and (E) of the Federal Clean Water Act exempts silvicultural, timber harvesting, and related road construction activities from permit requirements for the discharge of dredge and fill materials in wetlands. Executive Order 11990, as amended (42 U.S.C. 4321 et seq.), however, requires Federal agencies having statutory authority and leadership over Federal lands to avoid, to the extent possible, the short- and long-term adverse impacts associated with the destruction or modification of wetlands. Where feasible, direct and indirect support of new construction in wetlands must be avoided. Federal agencies are also required to preserve or enhance the beneficial values of wetlands in their land management actions.

Table 3-41 shows the existing miles of road and acres of previous timber harvest that have occurred on wetlands on Gravina Island.

Table 3-41  
Past Timber Harvest Activities on Wetlands on Gravina Island

	Existing Miles of Road	Acres of Past Harvest
Wetlands	1.6	187

Source: GIS query, A. Grundy, 2002

#### Floodplains

Executive Order 11988 directs Federal agencies to provide leadership and take action on Federal lands to avoid to the extent possible the long- and short-term adverse impacts associated with the occupancy and modification of floodplains.

Floodplains are composed of naturally eroded sediments carried by a stream or river and deposited in slack water sections of channels during high water periods. Floodplains are considered to be areas subject to a 1 percent or greater chance of flooding in any given year (at least 1 year in 100-year recurrence). Floodplains are among the most productive lowland areas in the project area for timber, wildlife and fisheries areas, due in part to nutrient-rich sediments. Wildlife use floodplains for forage and travel corridors.

Alluvial fans are formed where streams and rivers transition from fast-moving water (high-gradient) to slow-moving (low gradient) and soil materials are deposited by gravity. Alluvial fans provide fish-rearing habitat. Approximately 1,377 acres of floodplains and alluvial fans occur on Gravina Island.



## Environmental Consequences

### Effects on Wetlands

The predominant effect of timber harvest activities on wetlands is from excavating or filling for features such as roads, landings, and log transfer facilities. Road construction covers wetland vegetation with rock, resulting in the permanent loss of wetlands covered by the road prism, and in subtle changes in vegetation for distances of up to 20 feet on the downhill side of the road. Roads are located outside of estuarine, lacustrine, and riverine wetlands, to the maximum extent possible, to maintain their function.

When it is necessary to cross wetlands, appropriate BMPs and mitigation measures are incorporated into road designs. By minimizing the amount of side-ditching, effects upon groundwater flow and alteration of soil moisture levels are minimized. McGee (2000) found that drainage ditches collect and divert overland flow and shallow subsurface flow to the nearest stream channel, resulting in minimal effects on soil wetness in the wetlands adjacent to the road prism.

If Alternative 1 were selected, the existing wetlands would continue to function in their current state. Table 3-42 displays the amount of road construction on the various wetland types. More miles of new road would be constructed on wetlands under Alternative 4 than under Alternatives 3, 6, or 2. Road construction on wetlands would result in the loss of those wetlands under the road prism. Table 3-42 displays the relative amounts of wetland loss by alternative. The loss of these wetlands would represent less than 1 percent of the wetlands on Gravina Island and is considered minimal. Effects of road building in wetlands would be minimized by avoiding overburden disposal in wetlands, and minimizing road clearing limits and side-ditching. (Refer to Road Cards in Appendix B of the Draft EIS for details.)

**Table 3-42**  
**Miles of Proposed Road Construction on Wetlands<sup>2</sup>**

Wetland Type	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
Alpine/Subalpine Muskeg	0	0	0	0	0	0
Forested Wetlands	0	9.4	9.0	8.8	0	7.8
Estuarine	0	0	0	0	0	0
Sedge Fens	0	0.3	0.1	0.3	0	0.1
Muskeg	0	1.1	1.2	1.3	0	0.6
Muskeg/Forested Wetland Mosaic	0	0.2	2.7	2.5	0	2.5
Forested Wetland/Upland Mosaic	0	3.6	3.6	4.1	0	3.9
<b>Total Miles of Road Construction on Wetlands</b>	<b>0</b>	<b>14.6</b>	<b>16.6</b>	<b>17.0</b>	<b>0</b>	<b>14.9</b>
<b>Total Acres of Wetlands Converted to Road<sup>1</sup></b>	<b>0</b>	<b>42.3</b>	<b>48.1</b>	<b>49.3</b>	<b>0</b>	<b>43.2</b>

<sup>1</sup>Based on 2.9 acres of disturbance per mile of constructed road.

<sup>2</sup>Rounded to nearest tenth of a mile.

Source: C. Rose, GIS, 2004

Harvesting timber from forested wetlands temporarily changes the hydrology of the site and may cause an increase in water yield (Patric 1966), due to the reduction in forested vegetation. Vegetative properties of wetlands change with harvest from multiple-age old-growth stands to seral second-growth stands. Forest vegetation evaporates and transpires water from the soil, and soil moisture may be elevated until adequate re-growth has occurred. These conditions

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typically persist longer than on upland sites, as tree growth on wetland sites is slower than on adjacent upland sites. Soil moisture would be elevated until transpiration and interception surfaces were equivalent to pre-harvest conditions, and water yield may increase. Table 3-43 displays the number of harvest acres of forested wetlands by alternative.

**Table 3-43**  
**Proposed Timber Harvest on Forested Wetlands**

Wetlands	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
Proposed forested wetland <sup>1</sup> harvest (acres)	0	1,170	1,196	1,360	396	1,143
Percent of total proposed harvest on forested wetlands <sup>1</sup>	0	66%	61%	49%	73%	65%
Percent of forested wetland <sup>1</sup> acres on Gravina Island	0	12.8%	13.2%	15.0%	4.4%	12.6%

<sup>1</sup> Includes forested wetland/upland mosaic, and muskeg/forested wetland mosaic.

Source: P. Frohne, 2001

## Effects on Floodplains

Current Forest-wide Riparian Standards and Guidelines prohibit timber harvest on the active portion of floodplains. None of the action alternatives propose timber harvest in floodplain soils. All action alternatives, except Alternative 5, propose road building in floodplain/alluvial fan soils (see Table 3-44). Roads were only located on floodplains when there was no other feasible route available.

**Table 3-44**  
**Proposed Road Construction in Floodplains**

Soil Disturbance	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
Miles of road construction in floodplain soils <sup>2</sup>	0	0.51	0.37	0.43	0	0.26
Acres of disturbance from road construction in floodplains <sup>1</sup>	0	1.5	1.1	1.2	0	0.8

<sup>1</sup> Assumes 2.9 acres of disturbance per mile of road built.

<sup>2</sup> To the hundredth of a mile.

Source: C. Rose, GIS, 2004

## Direct and Indirect Effects

### Alternative 1

In Alternative 1, no wetlands or floodplains would be impacted in the project area.

### Alternative 2

The direct and indirect effects of Alternative 2 pose the third-highest impact to wetlands and floodplains. Timber harvest would occur on 1,170 acres of forested wetlands and 42 acres would be permanently lost due to conversion to road. Road construction would occur on 1.5 acres of floodplains.

### Alternative 3

The direct and indirect effects of Alternative 3 pose the second-highest risk to wetlands and floodplains. Timber harvest would occur on 1,196 acres of forested wetlands and 48 acres would be permanently lost due to conversion to road. Road construction would occur on 1.1 acres of floodplains.

### Alternative 4

The direct and indirect effects of Alternative 4 pose the highest risk to wetlands and floodplains. Timber harvest would occur on 1,360 acres of forested wetlands and 49 acres

would be permanently lost due to conversion to road. Road construction would occur on 1.2 acres of floodplains.

## Alternative 5

The direct and indirect effects of Alternative 5 pose the lowest impact to wetlands and floodplains of the action alternatives. Timber harvest would occur on 396 acres of forested wetlands, none of which would be permanently lost due to conversion to road. No road construction would occur on floodplains.

## Alternative 6

The direct and indirect effects of Alternative 6 pose the fourth-highest impact to wetlands and floodplains. Timber harvest would occur on 1,143 acres of forested wetlands and 43 acres would be permanently lost due to conversion to road. Road construction would occur on 0.8 acres of floodplains.

## Cumulative Effects

To estimate the cumulative effects of timber harvest and associated roads on wetlands on non-National Forest System lands, the IDT took into account both past and future activities. Approximately 1.6 miles of road and 187 acres of timber harvest occurred on wetland habitats from 1970 to 2000. In order to estimate timber harvest activities that would occur on wetlands between 2000 and 2015, the IDT gathered information from the Alaska Department of Natural Resources, Alaska Mental Health Trust, University of Alaska, and Ketchikan Gateway Borough.

Between 15.9 and 18.5 miles of road on wetlands may be constructed in the next 10 years for timber harvest activities on State lands, depending on the alternative. It is estimated that for every mile of road constructed, approximately 80 percent of non-National Forest System road would be constructed in wetland areas (Table 3-45). The design specifications for both National Forest System lands and non-National Forest System lands are expected to reduce road placement on high-value wetlands, unless unavoidable due to existing side slope conditions. Road construction on wetlands would result in the loss of those wetlands under the road prism. Table 3-45 displays the relative amounts of wetland loss by alternative, considering all ownerships. The loss of these wetlands would represent less than 1 percent of the wetlands on Gravina Island and is considered minimal.

**Table 3-45**  
**Cumulative Road Construction on Wetlands**

<b>Road Construction on Wetlands<sup>3</sup></b>	<b>Alt. 1</b>	<b>Alt. 2</b>	<b>Alt. 3</b>	<b>Alt. 4</b>	<b>Alt. 5</b>	<b>Alt. 6</b>
Existing road on wetlands (miles)	1.6	1.6	1.6	1.6	1.6	1.6
Proposed NFS road construction on wetlands (miles)	0	14.6	16.6	17.0	0	14.9
Potential road construction on wetlands by other agencies <sup>1,2</sup> (miles)	18.5	18.5	15.9	15.9	18.5	15.9
<b>Total Cumulative Miles of Road Construction on Wetlands</b>	<b>20.1</b>	<b>34.7</b>	<b>34.1</b>	<b>34.5</b>	<b>20.1</b>	<b>32.4</b>
<b>Total Cumulative Acres of Wetlands Converted to Road<sup>1</sup></b>	<b>58.3</b>	<b>100.6</b>	<b>98.9</b>	<b>100</b>	<b>58.3</b>	<b>94</b>

<sup>1</sup> Assumes 80 percent of planned road construction would be on wetlands. This is the average of the action alternatives percentage of road on wetlands (Table 3-40).

<sup>2</sup> See Table 3-20, Transportation section.

<sup>3</sup> Rounded to nearest tenth of a mile.

Source: C. Rose, GIS, 2004

Approximately 1,119 acres of timber harvest may occur in the next 10 years on State lands. It is estimated that 39 acres of this harvest may occur on forested wetlands. Alternative 2, if



### 3 Environment and Effects

implemented, would have the greatest cumulative effects on wetlands and floodplains, followed by Alternatives 4, 3, 6, and 5.

Table 3-46  
Cumulative Timber Harvest on Forested Wetlands

Forested Wetlands <sup>1</sup> (acres)	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
Past harvest on forested wetlands	187	187	187	187	187	187
Proposed forested wetland harvest on NFS lands	0	1,170	1,196	1,360	396	1,143
Potential forested wetland harvest on other ownerships <sup>2</sup>	39	39	39	39	39	39
<b>Cumulative Total (acres)</b>	<b>226</b>	<b>1,396</b>	<b>1,422</b>	<b>1,586</b>	<b>622</b>	<b>1,369</b>

<sup>1</sup> Includes forested wetland/upland mosaic, and muskeg/forested wetland mosaic.

<sup>2</sup> Assumes 3.5 percent of the potential harvest on other ownerships would occur on forested wetlands.

Source: P. Frohne, 2002, K. O'Connor, 2004

## Biodiversity and Old Growth

### Affected Environment

#### Biological Diversity

National Forest Management Act (NFMA) regulations define diversity as the distribution and abundance of different plant and animal communities and species (36 CFR 219). Biological diversity, or biodiversity, refers not only to the variety of organisms in an area; it also includes their genetic composition, the complex pathways that link organisms to one another and to the environment, and the processes that sustain the whole system. Biodiversity can be evaluated at different scales, ranging from genetic and species diversity to landscape diversity.

For managing forest ecosystems, biodiversity is evaluated at the larger landscape scale. The underlying assumption is that the maintenance of functioning ecosystems, achieved by protecting large, interconnected blocks of old-growth habitat, will conserve the species associated with them. In such a system, habitat must be well distributed over large geographic areas to allow interactions between individuals within and among populations, and the amounts, types, and arrangements of resources must be sufficient to provide for the daily, seasonal, and annual needs of reproductive individuals (Morrison et al. 1992).

#### Viability Analysis and Conservation Strategy

The NFMA regulations require that fish and wildlife habitats be managed to maintain viable populations of species well distributed across the Tongass National Forest (planning area). A viable population is defined as one having "the estimated numbers and distribution of reproductive individuals to insure its continued existence is well distributed in the planning area" (36 CFR 219.19).

Viability analysis is not required at the project level. During development of the Tongass Land Management Plan Revision Final EIS (Forest Plan FEIS) a conservation strategy was designed to insure that implementation of the Tongass Land Management Plan (Forest Plan) would provide reasonable assurance of maintaining viable and well-distributed populations across the Tongass National Forest for 100 years. Project areas, because of their relatively small size, are not expected to independently maintain viable populations, but management activities in such areas do need to consider project-level contributions to the Forest-wide strategy.

The strategy includes a Forest-wide system of Old-growth Reserves (OGRs) and other non-harvest land use designations, such as beach/estuary fringe, and a set of standards and guidelines that apply where timber harvest is permitted. The Reserve system includes three major elements: 1) all non-development LUDs that essentially maintain old-growth integrity, 2) full protection of islands less than 1,000 acres, and 3) small (~1,600 acre), medium (10,000+ acre), and large (40,000+ acre) Old-growth Reserves totaling 1.1 million acres (Forest Plan ROD, page 7).

The criteria for Old-growth Reserves are identified in Appendix K of the Forest Plan. Small OGRs should be 16 percent of the National Forest System land in each VCU, with at least 50 percent of the required reserve acres in productive old growth (POG). POG forest is defined as old-growth-condition forest having a timber volume greater than 8 thousand board feet (MBF) per acre.

### Affected Environment

#### Existing Old-growth Reserves

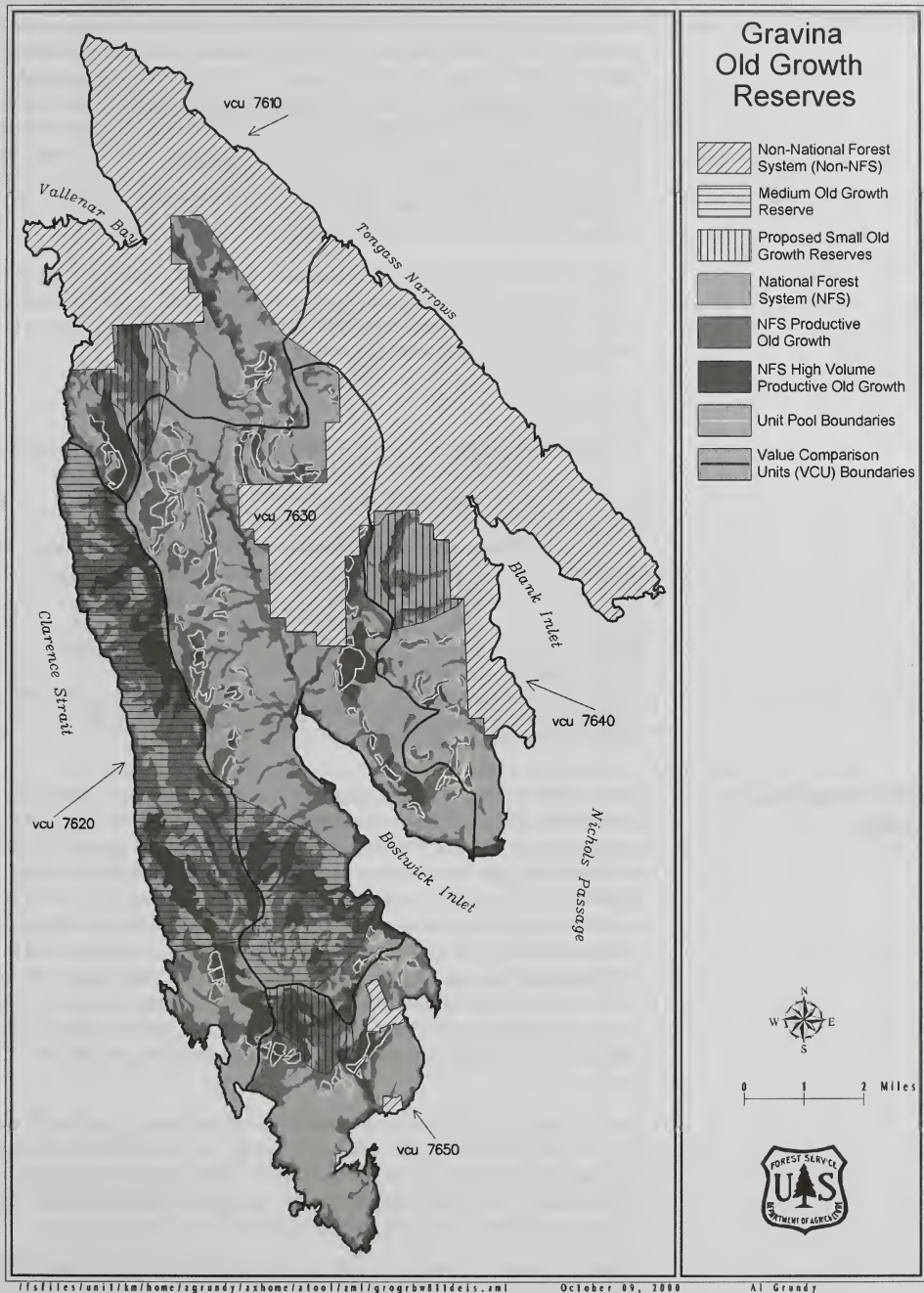
Gravina Island is approximately 61,404 acres in size and includes approximately 39,393 acres of National Forest System land in VCUs 7610, 7620, 7630, 7640, and 7650 (Figure 3-15). The project area contains one medium and three small Old-growth Habitat Reserves (Figure 3-15,

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Table 3-47). Ocean separates the reserves on Gravina from other reserves; the nearest reserves are across Tongass Narrows on Revillagigedo Island.



Figure 3-15  
Gravina Island Project Proposed Old-growth Habitat Reserves



Source: GIS, A. Grundy, 2000

### 3 Environment and Effects

#### Productive Old Growth and Old-growth Habitat Reserves

An interagency review of small OGRs was conducted in 1998 for the Gravina Island project to determine if the existing reserves meet the Forest Plan guidelines (Forest Plan, Appendix K). Small reserves are not required in VCUs 7620 and 7630 because adequate acres are protected in the medium OGR (Forest Plan, Appendix K-2). The small reserve in VCU 7610 does not currently meet the Appendix K guideline for total acres (16 percent of the VCU) and the reserve in VCU 7640 does not meet the guideline for acres of productive old growth (POG) (50 percent of the 16 percent). The interagency review team recommended expanding the boundaries of these two reserves. This recommendation included expanding the southern portion of the VCU 7610 reserve into VCU 7630 to encompass the upper reaches of the Grant Creek watershed. The Forest Plan allows for a small OGR to extend into an adjacent VCU under certain conditions (Forest Plan, Appendix K). The interagency team also recommended changing the location of the small reserve in VCU 7650 to better maintain connectivity with the medium OGR and to protect higher-value deer winter range.

Table 3-47 summarizes the proposed changes to the small reserves in VCUs 7610, 7640, and 7650. As proposed, each small reserve would exceed the Forest Plan guidelines for size and acres of POG. The Interagency Old-growth Reserve Review Report (1998) is located in the Gravina Island project planning record.

Table 3-47  
Proposed Changes to Gravina Island Small Old-growth Reserves

VCU	Forest Plan Criteria		Current Reserve		Recommended Reserve	
	Total acres	POG <sup>1</sup> acres	Total acres	POG acres	Total acres	POG acres
7610	818	409	783	493	1,041 <sup>2</sup>	610 <sup>2</sup>
7640	650	400	1,215	331	1,427	443
7650	824	412	1,036	559	867	729

<sup>1</sup> POG = Productive old-growth forest.

<sup>2</sup> The interagency review recommended expanding the small reserve for VCU 7610 into VCU 7630 to meet Forest Plan recommended acres. Included in VCU 7610 figures are 231 OGR acres/117 POG acres located in VCU 7630.

Source: Interagency Old Growth Reserve Review Report, 1998

#### Other Old-growth Forest

Most of the commercial forest land in the Tongass National Forest has not been harvested and commonly displays old-growth characteristics. Old-growth forests have aesthetic and cultural values and are important sources of forest products. Old-growth forests also provide important habitat for old-growth associated wildlife including Sitka black-tailed deer, American marten, black bears, Vancouver Canada geese, and cavity or snag-dependent species such as flying squirrels, woodpeckers, and some owls. The combination of a dense canopy with scattered small openings (typically 20 to 40 feet across) promotes forage growth within the openings. Overlapping branches and the large limbs within the canopy provide thermal insulation and often intercept enough snowfall to allow access to forage in winter. Large dead or defective trees provide nesting sites for marten, owls, eagles, wrens, and chickadees, among other species. They also create feeding sites for woodpeckers, sapsuckers, brown creepers, and other species.

Large, contiguous blocks of old-growth forest are more important to old-growth associated species than individual stands of trees. Large old-growth blocks provide expansive foraging and hunting territories, as well as protection from those predators that are most effective near forest edges. They also promote genetic mixing among populations that would be less likely to interbreed if they were spatially separated by forest fragmentation.

Clearcut timber harvest occurred on 628 acres of current NFS land in the project area in the late 1950s. Prior to harvest, approximately 50 percent of the NFS land on Gravina was productive old growth (POG) and approximately 17 percent was high-volume POG (an average volume of

35 MBF per acre). These estimates are based on the assumption that previous harvest occurred in high-volume stands, as evidenced by harvest patterns on other nearby areas. Nearly 97 percent of the original POG and 91 percent of the original high-volume POG remains on NFS lands on Gravina Island (Table 3-48). Areas of known second growth resulting from blowdown and fire were not included in the calculations of 1958 or current old-growth acres.

**Table 3-48**  
**Pre-timber Harvest (1958) and Current POG and High-volume POG**

VCU	National	POG Acres		High-volume POG Acres	
	Forest Acres <sup>1</sup>	1958	Current (% of 1958)	1958	Current (% of 1958)
7610	5,111	2,774	2,457 (89%)	1,104	787 (71%)
7620	8,751	6,300	6,009 (95%)	2,391	2,100 (88%)
7630	16,324	7,583	7,553 (99%)	2,294	2,264 (99%)
7640	4,062	1,004	1,004 (100%)	246	246 (100%)
7650	5,148	1,933	1,933 (100%)	728	728 (100%)

<sup>1</sup> Sum total of individual values do not equal project area total due to rounding errors.  
Source: J. Zelenak, GIS, 2000

## Coarse Canopy Forest

### Volume Class and Coarse Canopy Stands

There is much interest in the extent and location of coarse canopy stands, particularly when analyzing wildlife habitat. We are currently verifying the accuracy of the Existing Vegetation model, developed by Caouette and DeGayner (2002), for use in identifying those stands. Until that assessment is complete, the general consensus from interagency biologists is that timber volume classes 6 and 7 are an adequate predictor of coarse canopy stands. Characteristics of these stands include relatively low stem densities, large diameters, and a coarse-textured canopy when viewed from the air. There are currently 1,964 acres of volume class 6 and 64 acres of volume class 7 within the project area. Of this acreage, 1,407 acres are within areas not available for harvest, such as non-development LUDs, beach fringe buffers, and Riparian Management Areas (Table 3-52, Biodiversity and Old Growth section).

Coarse canopy forests provide the general attributes associated with old-growth forests: canopy gaps, fewer but larger trees, and a multiple-layer canopy. They provide a high level of snow interception and are therefore especially important during the winter. Caouette, Kramer, and Nowacki (2000) analyzed the differences in various methods of describing forest stands at a large scale. They found that volume class designations for the Tongass probably more accurately portray forest stand structure than volume. The 1997 Forest Plan method of describing high, medium, and low volume strata seems to be satisfactory for describing volume, but this method loses value for indicating structural characteristics. One method for estimating the location of coarse canopy forest is to look at volume classes 6 and 7. Only 11 percent of the POG in the project area is in volume classes 6 and 7 (Table 3-52). Approximately 69 percent of this coarse canopy acreage is contained in a non-harvest LUD or protected from harvest by Forest Plan Standards and Guidelines.



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#### Habitat Corridors and Connectivity

The maintenance of habitat corridors between blocks of old-growth forest can be important to minimize the probability of isolation and decline of wildlife species or populations associated with the blocks (Hunter 1990). Beach, estuary, and riparian buffers and other areas deemed inoperable for timber harvest because of unstable soils, steep slopes, economic isolation, or other factors can provide connectivity between old-growth blocks in addition to OGRs. In the Gravina Island project area, approximately 64 percent (12,155 acres) of the current POG and 72 percent (4,405 acres) of the current high-volume POG is protected in OGRs, beach, estuary, and riparian buffers, and in other lands not suitable for timber harvest.

It is likely that beach logging of select trees or groups of trees occurred along the Gravina Island coast during the past 100 years. Such logging probably occurred in small, localized areas, and is unlikely to have impacted the landscape at a scale that would compromise the integrity of the current beach buffer. However, about 45 years ago, 102 acres of clearcutting occurred in the beach buffer in four locations on National Forest System Lands and other locations on other ownership. Three of these harvested areas on National Forest System Lands have resulted in second-growth stands that interrupt the old-growth habitat found in the beach buffer. They include a 30-acre unit on the east side of Bostwick Inlet, a 15-acre unit on the north side of Phocena Bay, and a 35-acre unit on the southeast side of Phocena Bay. The average widths of these cuts are 600, 500, and 900 feet, respectively. They should begin to exhibit old-growth characteristics in another 100 to 150 years. Past timber harvest on other ownerships in the Bostwick Inlet, Vallenar Bay and Seal Cove areas have likewise interrupted the old-growth habitat in the beach buffer. These areas are similar in size and effects.

In addition to the interruptions mentioned above, other interruptions have occurred as a result of development. The Pacific Log and Lumber mill site and the Ketchikan Airport Reserve have interrupted the continuity of the beach buffer on the east side of Gravina Island.

## Environmental Consequences

### Modifications to Old-growth Reserves

All action alternatives would incorporate the modifications to the OGRs recommended by the interagency review. With the modifications, the reserves in the Gravina Island project area would include the 9,996-acre medium reserve in VCUs 7620 and 7630, and three small reserves totaling 3,335 acres. These reserves would encompass nearly 34 percent of the total National Forest System acres, 46 percent of the current National Forest System POG, and 51 percent of the current high-volume POG on National Forest System land in the project area (Table 3-49). Modifications recommended by the interagency review would not be adopted under the No-action Alternative.

Table 3-49  
Gravina Old-growth Reserves by VCU

VCU	Current National Forest Acres			Proposed Old-growth Reserve Acres		
	Total <sup>1</sup>	POG <sup>2</sup>	HV POG <sup>2</sup>	Total	POG <sup>2</sup>	HV POG <sup>2</sup>
7610 <sup>3</sup>	5,111	2,457	787	1,041 <sup>3</sup>	610 <sup>3</sup>	106
7620	8,751	6,009	2,100	6,965	5,020	1,735
7630 <sup>3</sup>	16,324	7,553	2,264	3,031 <sup>3</sup>	1,895 <sup>3</sup>	822
7640	4,062	1,004	246	1,427	443	109
7650	5,148	1,933	728	867	729	345

<sup>1</sup> Sum total of individual values do not equal project area total due to rounding errors.

<sup>2</sup> POG = Productive old-growth forest; HVPOG = High-volume productive old-growth forest.

<sup>3</sup> The interagency review recommended expanding the small reserve for VCU 7610 into VCU 7630 to meet Forest Plan recommended acres. Included in VCU 7610 figures are 231 OGR acres/117 POG acres located in VCU 7630.

Source: Interagency Old-growth Reserve Review Report, 1998

No harvest is allowed in Old-growth Reserves. Therefore, they are not analyzed further. The Gravina Island Timber Sale project is consistent with the Forest Plan land allocations and Standards and Guidelines. Any project that is consistent with the Forest Plan is a subset of the Forest-wide analysis and would, by definition, also provide reasonable assurance of maintaining viable wildlife populations.

## Effects of Timber Harvest

The action alternatives for the Gravina Island project propose harvesting between 803 and 2,218 acres of old-growth forest using a combination of even-aged, uneven-aged, and two-aged silvicultural systems (see Table 3-3 in the Silviculture and Timber Management section in this chapter). Within the Timber Management LUD, units that do not occur in high-value marten habitat (defined as high-volume POG below 1,500 feet in elevation) may be harvested by traditional clearcutting. In uneven and two-aged units, trees may be retained in clumps within a given unit, or they may be more evenly distributed throughout the unit. Such trees contribute to Marten Standards and Guidelines and may also contribute to areas deferred from harvest for other resource concerns including stream buffers, steep slopes, unsuitable soils, etc. In such cases, openings in the forest canopy created by timber harvest would be smaller than the overall size of the units, and some mature trees would remain after harvest.

Of the action alternatives, Alternative 4 would harvest the most POG acres, high-volume POG acres, coarse canopy acres, and would involve the most clearcutting (Table 3-50 and Table 3-3, Silviculture and Timber Management section). Conversely, Alternative 5 would harvest the fewest POG acres, the fewest coarse canopy acres, and would clearcut the fewest acres (approximately 73 percent of the harvest acres would use an alternate harvest system). Alternative 6 would harvest the fewest acres of high-volume POG and clearcut the second fewest acres. Alternatives 2 and 3 would harvest similar amounts of POG, high-volume POG, and coarse canopy acres. Although Alternatives 2 and 3 propose to harvest fewer total acres than Alternative 4, they would involve a higher percentage of clearcutting (approximately 63 and 61 percent, respectively). Of these two, Alternative 3 would harvest more POG acres but fewer acres of high-volume POG, and would incorporate slightly more uneven-aged and two-aged harvest.

**Table 3-50**  
**Project Harvest and Percent Reduction of POG and High-volume POG**

Alt.	Total (POG) <sup>1</sup> Acres Harvested	Percent Reduction In Current POG <sup>1</sup>	HV POG <sup>2</sup> Acres Harvested	Percent Reduction In Current HV POG <sup>1</sup>
1	0	0	0	0
2	1,801	10	474	8
3	1,818	10	460	8
4	2,218	12	653	11
5	803	4	323	5
6	1,562	8	244	4

<sup>1</sup> POG = Productive old-growth forest

<sup>2</sup> HVPOG = High-volume productive old-growth forest; acres of HVPOG are included in the total (POG) acres.

Source: J. Zelenak, GIS, 2000

Table 3-51 displays the cumulative reduction of POG and high-volume POG since 1958. These include acres harvested to date, which is the same for all alternatives, and the reduction in acres resulting from the proposed harvest for each of the Gravina Island project alternatives.

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Table 3-51  
Cumulative Percent Reduction in POG and High-volume POG on NFS Lands

Alt.	POG Acres Remaining	Percent Reduction of POG since 1958	HV POG Acres Remaining	Percent Reduction of HV POG since 1958
1	18,956	3	6,125	9
2	17,155	12	5,651	16
3	17,138	13	5,665	16
4	16,738	15	5,472	19
5	18,153	7	5,802	14
6	17,394	11	5,881	13

Source: J. Zelenak, GIS, 2000

Table 3-52 shows the proposed harvest of coarse canopy forest by alternative.

Table 3-52  
Acres of Harvest in Coarse Canopy Forest by Alternative

NFS POG	Acres of Coarse Canopy Forest <sup>1</sup>			Coarse Canopy Forest Proposed for Harvest					
	Total	Harvest not permitted <sup>2</sup>	Harvest permitted	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
18,956	2,028	1,407	621	0	179	191	232	41	153

<sup>1</sup> Volume classes 6 and 7

<sup>2</sup> Includes lands protected by non-harvest LUDs as well as those protected under Standards and Guidelines

Source: A. Grundy, 2002

All action alternatives are consistent with the Forest Plan land allocations and Standards and Guidelines, which were designed to provide reasonable assurance of preserving adequate habitat to maintain viable populations of wildlife and fish. Therefore, although all action alternatives propose harvesting old-growth forest habitat, none is anticipated to directly impact the old-growth ecosystem to a degree at which biological diversity or population viability would be compromised at the planning level.

#### Effects to Habitat Corridors and Connectivity

Alternatives 2 through 6 would reduce old-growth connectivity from existing conditions, but not to the extent that it would cause barriers to wildlife dispersal. Connectivity is maintained through OGRs, non-development LUDs, and beach/estuary and riparian buffers. No timber harvest units are located in the beach buffer, but Alternative 2 constructs a road and LTF within the beach buffer. This construction would be considered a minor adverse effect of short duration on the beach buffer and is permissible under the Forest Plan. The road and LTF would be decommissioned after usage and allowed to revegetate.

Approximately 64 percent (12,155 acres) of the current POG and 72 percent (4,405 acres) of the current high-volume POG is protected in OGRs, beach, estuary, and riparian buffers, and in other LUDs not suitable for timber harvest. These elements of old-growth habitat are well distributed over the landscape (Figure 3-16).

#### Roads

Road building may impact populations of some wildlife species. Alternatives 2, 3, 4 and 6 propose the construction of 17.4 to 22.2 miles of road, including temporary and classified roads on both NFS lands and non-NFS lands. In Alternatives 2, 3, and 6, roads would be physically closed to motorized vehicles after timber harvest is completed. In Alternative 4, the 8100000-8105000 mainline road would remain open after timber harvest. Alternatives 3, 4, and 6



would connect with a new road proposed to be built by the Ketchikan Gateway Borough, to transport timber to the existing land-to-barge bulkhead facility on the Tongass Narrows; approximately 1.65 miles of this road would be used for the project.

Potential impacts of roads on particular wildlife species and subsistence resources are discussed in the Wildlife and Subsistence sections of this chapter.

## Cumulative Effects

### Other Land Ownerships

For the action alternatives, individual sale offerings and harvest activities are likely to be completed within the next 5 years. No other National Forest System timber sales are scheduled on Gravina Island at this time, but non-National Forest owners have indicated they will likely harvest portions of their land. Approximately 22,011 acres (36 percent) of Gravina Island are in State, Ketchikan Gateway Borough, or private ownership. This includes nearly all of the land within 1 mile of Tongass Narrows, land surrounding Blank Inlet and Vallenar Bay, some land in the interior of the island, and several small inholdings on the south end of the island.

Alaska Department of Natural Resources (DNR) has indicated they will move forward with a timber sale on State lands on Gravina Island regardless of activities on NFS lands. Under current plans up to 20.5 MMBF (800 acres) of timber harvest could be offered in 2005-2012 from DNR-managed lands. DNR estimates that an additional 825 MBF (39 acres) could be harvested from Alaska Mental Health Trust lands, and 7 MMBF (280 acres) could be harvested from University of Alaska lands. These acres can reasonably be considered POG that will be lost if harvesting occurs as planned. Up to 17.9 miles of road may be built for this harvest.

Alaska Department of Transportation and Public Facilities and Ketchikan Gateway Borough are considering alternatives to increase access between the city of Ketchikan and the airport. The Borough is proposing to build a total of 2.5 miles of road from the airport to the Pacific Log and Lumber Co. sawmill on the Tongass Narrows. In the Gravina Access Project Draft EIS (August 2003), the preferred alternative (F-1) is to construct bridges between Ketchikan and Gravina Island, via Pennock Island, and build 2.7 miles of road to the airport. These projects would likely lead to additional development and road construction on Borough lands adjacent to the airport, as envisioned in the Borough's Gravina Area Plans.

None of the above mentioned activities would have an adverse affect on old-growth habitats on National Forest System lands. Effects to wildlife species is discussed in the wildlife section of this chapter. Habitat connectivity across and between other ownerships is anticipated to decrease, due to timber harvests planned on other ownerships. No other timber harvests are known to be planned in the beach buffer on other ownerships at this time, so changes in the continuity of the beach buffer are not anticipated to change.

## Threatened, Endangered, and Sensitive Species

This section describes the occurrence of and project effects on species that are federally listed as threatened or endangered by the U.S. Fish and Wildlife Service or the National Marine Fisheries Service under the authority of the Endangered Species Act of 1973, as amended. It also includes equivalent information on Forest Service sensitive species. It is based on the combined Biological Assessment and Biological Evaluation that was prepared for the Gravina Timber Sale as required by Section 7 of the Endangered Species Act and the USDA Forest Service Threatened, Endangered and Sensitive Plant and Animal Species Policy (FSM 2670). The Biological Assessment and Biological Evaluation is available in Appendix D and in the Gravina Island project planning record.

## Affected Environment

Threatened and endangered species potentially occurring in the project area were identified through consultation with the U.S. Fish and Wildlife Service and the National Marine Fisheries Service. No threatened or endangered species under the jurisdiction of the U.S. Fish and Wildlife Service are known to occur in the project area. One endangered species, the humpback whale, and one threatened species, the Steller sea lion, both under the jurisdiction of the National Marine Fisheries Service, occur in waters adjacent to the project area. No designated critical habitats for either species occur within the project area. A complete analysis of threatened and endangered species that may potentially be impacted by the Gravina Island project is presented in the Biological Assessment and Biological Evaluation (Appendix D). All consultation correspondences are located in the Gravina Island project planning record.

One endangered species, one threatened species, and 14 Forest Service sensitive species are thought to occur or potentially occur in or adjacent to the Gravina Island project area. Surveys were conducted for sensitive species including the Queen Charlotte goshawk and all Forest Service sensitive plants (Table 3-53).

Table 3-53  
Alaska Region Sensitive Species that May Occur in the Gravina Island Project Area

Common Name	Scientific Name	Surveys Conducted?	Observed in Project Area?
Queen Charlotte goshawk	<i>Accipiter gentilis laingi</i>	Yes	Yes
Trumpeter swan	<i>Cygnus buccinator</i>	No	Yes
Osprey	<i>Pandion haliaetus</i>	No	No
Peale's peregrine falcon	<i>Falco peregrinus pealei</i>	No	No
Goose-grass sedge	<i>Carex lenticularis</i> var. <i>dolia</i>	Yes	No
Edible thistle	<i>Cirsium edule</i>	Yes	No
Davy mannagrass	<i>Glyceria leptostachya</i>	Yes	No
Wright filmy fern	<i>Hymenophyllum wrightii</i>	Yes	No
Truncate quillwort	<i>Isoetes truncata</i>	Yes	No
Calder lovage	<i>Ligusticum calderi</i>	Yes	No
Bog orchid	<i>Platanthera gracilis</i>	Yes	No
Loose-flowered bluegrass	<i>Poa laxiflora</i>	Yes	Yes
Unalaska mist-maid	<i>Romanzoffia unalaschcensis</i>	Yes	No
Queen Charlotte butterweed	<i>Senecio moresbiensis</i>	Yes	No

Source: J. Zelenak, K.Dillman, 2000

## Environmental Consequences

### Direct and Indirect Effects - Threatened and Endangered Species

#### Humpback Whale

Humpback whales are occasionally found in waters bordering the project area. The local distribution of humpbacks in Southeast Alaska appears to be correlated with the density and seasonal availability of prey, particularly herring and euphausiids (shrimp-like crustaceans). Important feeding areas include Glacier Bay and adjacent portions of Icy Strait, Stephen's Passage/Frederick Sound, Seymour Canal, and Sitka Sound. None of these are within or adjacent to the project area.

No direct or indirect effects on whales are anticipated from implementation of forest management activities under any alternative. Forest Plan Standards and Guidelines for Threatened and Endangered Species provide for the protection and maintenance of whale habitats. All project-related activities would be conducted in a manner consistent with the Marine Mammal Protection Act, the Endangered Species Act, and National Marine Fisheries Service regulations for approaching whales, porpoises, and dolphins.

#### Steller Sea Lion

Steller sea lions range from Hokkaido, Japan, through the Kuril Islands and Okhotsk Sea, Aleutian Islands and central Bering Sea, the Gulf of Alaska, southeastern Alaska, and south to central California. They are occasionally found in waters bordering the project area. Information on Steller sea lion population trends in Southeast Alaska is limited but suggests the population is stable. There are no known Steller sea lion haul-out locations in the project area; the closest is on the southern tip of Grindall Island, at the south end of Kasaan Peninsula, about 10 miles to the northwest.

No direct or indirect effects on sea lions are anticipated from implementation of forest management activities under any alternative. Forest Plan Standards and Guidelines for Threatened and Endangered Species provide for the protection and maintenance of sea lion habitats. All project-related activities would be conducted in a manner consistent with the Marine Mammal Protection Act, the Endangered Species Act, and National Marine Fisheries Service regulations for approaching sea lions and seals.

### Direct and Indirect Effects - Forest Service Sensitive Species

The Forest Service Regional Forester may designate species as "Sensitive" if a viability concern has been identified due to a predicted or documented downward trend in populations or habitat and where continued downward trends may lead to local or Forest-wide extirpation, Federal listing under the Endangered Species Act, or both. The Forest Service has identified 14 sensitive plant and animal species that could potentially occur in or near the Gravina Island project area. A complete analysis of sensitive species that may potentially be impacted by the Gravina Island project is presented in the Biological Assessment and Biological Evaluation (Appendix D).

#### Queen Charlotte Goshawk

The northern goshawk, including the Queen Charlotte subspecies which is present in Southeast Alaska, has been a species of concern across all of its range. The Queen Charlotte goshawk is associated with forests having tall trees, dense canopies, and fairly open understories. These features allow goshawks to hunt beneath the tree canopy, and to capture prey before the prey escapes into the tree or shrub layer. The dense canopy in tall trees fosters an abundant assemblage of prey species and provides a microclimate suitable for nesting. In Southeast Alaska, goshawks forage over home ranges that are typically 6,000 to 8,000 acres, although home ranges may be twice that size in fragmented forests.

All action alternatives would harvest stands capable of providing nesting and/or foraging habitat for goshawks. Studies of goshawks elsewhere on their range have suggested that extensive timber harvest may result in reduced goshawk abundance, reduced nest re-occupancy in smaller stands and after timber harvest, and lower breeding density and reproduction in more fragmented or heavily harvested landscapes (Iverson et al. 1996). The relationships between



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these population parameters and timber management in Southeast Alaska are not well established. However, telemetry data indicate that goshawks in Southeast Alaska disproportionately select old-growth forest habitats and avoid even-aged second-growth stands that result from clearcutting (Iverson et al. 1996). All action alternatives propose even-aged silvicultural systems for productive old-growth forest (Table 3-49 in the Biodiversity section in this chapter). Under Forest Plan Standards and Guidelines for marten, all even-aged units in high-value marten habitat (high-volume stands below 1,500 feet elevation) would retain at least 10 percent canopy cover. Stands resulting from this silvicultural system may have some value as goshawk habitat compared to traditional clearcut harvesting, but goshawks are known to avoid non-forested areas (<10 percent tree cover) (Iverson, et. al. 1996).

The Forest Plan defines high-value goshawk habitat as high-volume old growth below 1,000 feet in elevation and on slopes less than 60 percent. Using information from the Forest Service GIS database, a data layer was created to estimate this habitat for the Gravina Island project area. Because a slope category of less than 55 percent is used for other analyses, it was also used in this analysis, resulting in a conservative estimate of the amount of potentially high-value goshawk habitat. According to this analysis, there are about 3,046 acres of potentially high-value goshawk habitat in the project area. Old-growth Habitat Reserves, beach, riparian, and estuary buffers, and other areas not suitable for timber harvest, retain approximately 59 percent of these acres.

Between 1994 and 1999, 39 goshawk surveys were completed on Gravina Island. Surveys followed Tongass National Forest protocols and included 21 transects with 142 call stations representing 105 hours of effort, and 23 overlook, valley-watch, or dawn observation stations representing 85 hours of effort. Three surveys were completed in VCU 7610 in 1998 and 1999, six were completed in VCU 7630 in 1998, and 30 were completed in VCU 7620 between 1994 and 1999. Because of previous sightings and observations of goshawks exhibiting nesting behavior, most efforts focused on an area near Phocena Bay in VCU 7620. Surveys during 2002 and 2003 in the Phocena Bay area did not detect any goshawks. Previous efforts resulted in five positive identifications of goshawks in that area and additional possible sightings. However, to date, no goshawk nests have been located on Gravina Island.

Although no goshawk nests have been found in the Gravina Island project area, multiple confirmed observations in the Phocena Bay area suggest the presence of a breeding territory. It is possible that other undetected breeding territories occur in the project area. Any goshawk nests found prior to harvest will be protected by implementing Forest Plan Standards and Guidelines.

## Trumpeter Swan

The trumpeter swan is the largest waterfowl species in the world. Its present range is only a fraction of the vast area of North America it historically inhabited in both summer and winter. Trumpeter swans that breed in Alaska spend the winter along the Pacific Coast from Southeast Alaska to the mouth of the Columbia River. There are two records of swan sightings on Gravina Island, both in February of 1992; two swans were observed at Bostwick Lake and 31 were recorded at Bostwick Inlet. Swans typically leave for their breeding areas by mid-April and have not been reported in or near the project area during the summer.

All alternatives fully incorporate Forest Plan Standards and Guidelines for trumpeter swans. These prohibit disturbance of trumpeter swans during the nesting, brood-rearing, and wintering periods. If trumpeter swans are observed using habitats within the project area, road building and timber harvesting would not occur within 0.5 miles of these habitat when swans are present (usually from November 1 to April 1). No project-related activities are anticipated to directly or indirectly impact this species.

## Osprey

Ospreys occur in low numbers in Southeast Alaska during the spring/summer nesting period from late April through August. Ospreys typically nest in broken-top spruce (live or dead) and

snags of western hemlock in hemlock/spruce forest types near streams or coastal beaches. Historically, the Southeast Alaska population of osprey appears to have remained stable but low. It is unknown why ospreys occur in relatively low numbers in this region, but available nest sites and foraging areas do not appear to be limiting factors. Ospreys have been known to stop during migration in areas surrounding the project area. Although no osprey sightings or nests have been recorded on the project area, small lakes on Gravina Island may provide an opportunity for migrating osprey to rest and feed. No project-related activities are anticipated to directly or indirectly impact ospreys.

## **Peale's Peregrine Falcon**

The nest distribution of this subspecies is closely associated with large seabird colonies, and seabirds are believed to be the major prey of the falcon. In Southeast Alaska, Peale's peregrines nest on the outer islands west of Prince of Wales Island. No nest sites for this species have been found on Gravina Island, nor have any observations been reported. No project-related activities are anticipated to directly or indirectly impact this species.

## **Direct and Indirect Effects - Sensitive Plants**

Surveys for sensitive plants were conducted for the Gravina Island project in 1998, 1999 and 2000 (Dillman 2000, 1999a, 1999b; Woolwine 1998). Inventories focused on ten vascular plant species listed as sensitive by the Alaska Regional Forester and that were likely to occur in the project area. At the direction of the Region 10 botanist, field personnel used survey methods in accordance with Levels 3 and 4 ("Limited Focus" and "General") of the survey intensity levels recommended by the Forest Service. Unique and unusual habitats were visited first, followed by interior potential harvest areas and proposed road lines. Among the sensitive plants, only loose-flowered bluegrass was found in the project area. It was designated as potentially affected by project activities.

Field personnel also searched for additional species that have been placed on a Vascular Plant Tracking List by the Alaska Natural Heritage Program (2003), each with distinctive global and State rankings. This list is updated periodically. Thirteen of these rare plants and three rare lichens were found in the project area, five of which were designated as potentially affected by project activities. Information on rare plants and lichens can be found in the botany resource report in the planning record.

## **Loose-flowered Bluegrass**

Loose-flowered bluegrass is associated with moist, open lowland woods and open-forest meadows. During 1999 field surveys, a small population of this species was located near the lower Bostwick Creek road crossing (on the 8100000-6 road segment) proposed in Alternatives 2 and 4. This population could be impacted by road-building activities associated with these two alternatives, as Bostwick Creek is its only known location on Gravina Island. No roads are proposed in this area under Alternatives 3 or 6, and there would be no impacts from these alternatives. Should Alternative 2 or 4 be selected, the stream crossing would be moved during final layout to avoid impacts to the loose-flowered bluegrass population associated with the road.

## **Cumulative Effects**

At this time, there are no additional harvest activities proposed on National Forest System lands within the reasonably foreseeable future. Timber harvest activities and other developments are anticipated on other ownerships. Table 3-9 (in the Silviculture and Timber Management section in this chapter) shows the estimated acres of harvest on other lands. In the Gravina Access Project Draft EIS (August 2003) the preferred alternative is to construct a bridge connecting Gravina and Revillagigedo Islands and a road on Borough lands to the airport. If this happens, increased use of the Gravina Island project area is probable. However, under Alternatives 2, 3, and 6, the roads constructed for the Gravina project would be closed to motorized vehicles after completion of project activities. This would restrict access to foot traffic, which decreases the risk to any sensitive plant or animal species.

In Alternative 4, the 8100000-8105000 mainline road would be maintained as open, allowing motorized access to the Bostwick Creek watershed in the interior of the island. DNR is

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planning a timber sale and associated road construction on their lands in the Bostwick Creek watershed; these roads would likely be closed upon completion of timber harvest activities. Conceptually, the Gravina Access Project road could ultimately link with the National Forest System open road system. (See the Transportation section in this chapter for additional information.) This cumulative increase in human access could adversely affect the loose-flowered bluegrass population; however, the chances of this population being harmed are slight because the location is several miles from the proposed road junction on the east side of the island and is a short distance from the planned road. No other threatened, endangered or sensitive species would be affected.



## Wildlife

The following analyses are tiered to the wildlife analyses contained in the 1997 Tongass Land Management Plan Revision Final EIS (Forest Plan FEIS), Chapter 3 and Appendix N. Applicable direction is included in the 1997 Forest Plan Record of Decision (ROD), and in Chapters 3 (Management Prescriptions) and 4 (Forest-wide Standards and Guidelines) and Appendix K of the Forest Plan. The project area Old-growth Reserve (OGR) system is described in detail in the Biodiversity and Old-growth section of this document. The unit and road cards for the project, located in Appendix B of the Draft EIS, contain additional site-specific information and requirements.

## Affected Environment

Biogeographic provinces and Game Management Units (GMUs) are geographical areas defined by the Alaska Department of Fish and Game (ADFG) to manage wildlife populations. Wildlife Analysis Areas (WAAs) are further subdivisions of GMUs and are used by ADFG for data collection purposes. Value Comparison Units (VCUs) are National Forest System land divisions that usually approximate watersheds. The latter two are the divisions used most often by the Forest Service for wildlife habitat analyses. Deer and wolves are generally analyzed at the WAA level to correspond with harvest data available from the State and because of the large home range size of wolves (Tongass Plan Implementation Policy Clarification, page 16). Marten are generally analyzed at the VCU level (Forest Plan, page 4-119). The Gravina Island project area is WAA 101 of GMU 1; it consists of VCUs 7610, 7620, 7630, 7640, and 7650 (Figure 3-15, Biodiversity section). The Gravina project boundary is the same as the WAA 101 boundary. Gravina Island occurs within a high-risk biogeographic province for marten, according to the Forest Plan.

Wildlife species depend on a variety of forest structures to meet their habitat needs. Although each action alternative proposes harvest of forested wildlife habitat, Forest Plan Standards and Guidelines protect some key habitats under all alternatives. These include riparian habitats on Class I, II, and III streams, all beach and estuary fringe habitats, high-value American marten habitat, nest buffers, and areas not suitable for timber harvest. These areas, combined with OGRs, result in the protection of 64 percent of the productive old growth (POG), and 72 percent of the high-volume POG habitat on National Forest System lands on Gravina Island (see the Biodiversity and Old-growth section in this chapter).

Management Indicator Species (MIS) are those wildlife species whose responses to land management activities are thought to reflect the likely responses of other species with similar habitat requirements. Under the MIS concept, the responses to management activities of a relatively few species are studied and monitored in an effort to ascertain the impacts to entire assemblages of species and associated habitats. MIS are used to assess population viability and biological diversity, and for management of game species. MIS are also used to help establish management goals for other species in public demand. The following have been selected as MIS for the Gravina Island project:

Management Indicator Species	Basis for Selection
Sitka black-tailed deer	Important subsistence and game species; range of forested habitats
Alexander Archipelago wolf	Population concerns, furbearer and game species
American marten	Represents high-volume old-growth forest

## Management Indicator Species

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These species were selected because they were deemed the most likely to be significantly impacted by timber harvest activities on the project area. Additionally, there is a substantial and growing body of current research on these species that allows quantifiable estimates of potential impacts of habitat alteration on population dynamics. For example, the relationship between road density and trapping or hunting of marten and wolves has been investigated, and results of these studies were used to develop Forest Plan Standards and Guidelines for these species. Further, interagency panels constructed habitat suitability models for deer and marten during development of the current Forest Plan. Because wolves in Southeast Alaska are so strongly dependent on deer for prey, deer model results are also used to assess habitat quality for wolves.

The following species are identified as MIS for the Tongass National Forest as a whole, but were not selected as MIS for the Gravina Island project. The rationale is summarized below, and further discussed in the Wildlife resource report in the project planning record.

#### Management Indicator Species

#### Basis for Non-Selection

River otter, Vancouver Canada goose  
black bear, bald eagle

Primary habitat protected by Forest Plan Standards and Guidelines. No harvest is scheduled in these habitats.

Hairy woodpecker, brown creeper, red-breasted sapsucker, red squirrel

Habitat protected under Forest Plan Old Growth Reserves, Standards and Guidelines for marten and cavity-nesters, and non-harvest areas.

Mountain goat, brown bear

Does not occur in the project area

Beach, estuary fringe, and riparian habitat comprise the primary habitat for the first four species. River otter prefer habitat, especially old growth forest, immediately adjacent to coastal and fresh water environments. Vancouver Canada geese use wetlands in estuary, river, and upland areas of the forest (Forest Plan FEIS, page 3-364). Estuary, riparian, and forested coastal habitats receive the highest use by black bears and appear to have the highest habitat value. These habitats are protected by Forest Plan Beach and Estuary Fringe Standards and Guidelines (Forest Plan, pages 4-4 and 4-5), Riparian Standards and Guidelines (Forest Plan, pages 4-53 thru 4-57), and Waterfowl Standards and Guidelines (Forest Plan, pages 4-11 and 4-116), and are not proposed for harvest in the Gravina Island project.

All bald eagle nests on National Forest lands within the Gravina project area occur within the 1000-foot beach fringe buffer and are protected from harvest. All identified nests are protected by a minimum 330-foot radius protective habitat management zone (Forest Plan FEIS, pages 3-363 and 3-356) and also receive protection under the Interagency Agreement between the Forest Service and the U.S. Fish and Wildlife Service. This Agreement places seasonal timing and activity restrictions for repeated helicopter flights within a quarter mile of active nests and for road blasting activities within half a mile of active nests. All nests potentially affected by such activities would be monitored to determine if breeding eagles are present.

Hairy woodpeckers, brown creepers, red-breasted sapsuckers, and red squirrels are protected through old-growth reserves, old growth in other non-harvest LUDs and buffers, Cavity Nester Standards and Guidelines (Forest Plan, pages 4-117 & 4-118), and reserve trees/snag retention requirements within high-value marten habitat (Forest Plan, pages 4-119). Live trees left to meet Marten Standards and Guidelines contribute to future recruitment of snags.

## Environmental Consequences

### Effects on MIS

Low-elevation old-growth habitat is important to some wildlife species including Sitka black-tailed deer, Alexander Archipelago wolf, Queen Charlotte goshawk, and American marten. Table 3-54 displays past timber harvest, current POG, and proposed harvest acres by action alternative and relative to elevation category for the Gravina Island project.

Table 3-54  
Productive Old Growth (POG) Harvest Acres Relative to Elevation

Elevation Category (ft.)	Acres Harvested 1958-1960	Current POG Acres	Proposed POG Harvest Acres by Alternative				
			Alt. 2	Alt. 3 <sup>1</sup>	Alt. 4	Alt. 5	Alt. 6
0-800	585	11,123	1,265	1,187	1,607	688	986
800-1500	49	6,350	518	612	593	112	556
>1500	0	1,483	18	20	18	3	20

<sup>1</sup> Sum total of individual values do not equal total harvest acres due to rounding errors.

Source: GIS, A. Grundy, 2002.

### Sitka Black-tailed Deer

The Sitka black-tailed deer was chosen as an MIS because it is an important game and subsistence species and because it is associated with old-growth forests. This species receives the highest subsistence and sport hunting use of all mammals in Southeast Alaska. Gravina Island is an important hunting area for Ketchikan, Metlakatla, and Saxman deer hunters. Research conducted in Southeast Alaska indicates that low-elevation, high-volume productive old-growth habitats are particularly important to deer, especially during severe winters (Schoen et al. 1985, Hanley and Rose 1987, Yeo and Peek 1992). These mature old-growth stands intercept snow, provide thermal cover, and support the largest biomass of herb and shrub forage for deer (Alaback 1982). Deer populations are impacted by the combination of deep-snow winters and the conversion of winter habitat to second-growth. Snow reduces or eliminates forage availability in young clearcuts. Closed canopy second-growth stands provide little forage in all seasons (Forest Plan Final EIS, pages 3-365 through 3-368). Results of deer pellet surveys conducted jointly by ADFG and the Forest Service suggest that deer numbers on Gravina Island have remained stable since surveys began in 1981 (Kirchhoff 2000).

#### Deer Habitat Modeling

An interagency model (Suring et al. 1992) developed to evaluate potential winter habitat capability (carrying capacity) for deer was updated for the Forest Plan. The model calculates habitat suitability indices (HSIs) based on timber volume strata (high, medium, low), aspect, elevation, and typical snowfall. Low-elevation, high-volume old-growth stands with southern aspects in low snowfall areas provide the best deer winter habitat. Areas above 1,500 feet elevation are assumed to have no value as winter deer habitat.

The model estimates habitat capability for two time periods. In the first 25 years after harvest (the shrub-sapling stage), habitat capability in high-volume strata stands 42 to 95 percent, depending on typical snowfall. During the same interval, habitat capability in medium- and low-volume strata stands increases after harvest by about 20 percent and 90 percent, respectively, in low snowfall areas due to increased forage availability, but decreases in areas with intermediate or high snowfall levels. Gravina Island is designated as a low snowfall area. Beginning at year 26 after harvest (the stem exclusion stage), habitat capability in high-, medium-, and low-volume strata old-growth stands decreases by 90 to 98 percent, regardless of snowfall, aspect, or elevation. Because the most significant and longest lasting impacts to habitat capability are those that occur more than 26 years after timber harvest, reductions in habitat capability are reported for this stage (Table 3-55).



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#### Direct and Indirect Effects on Deer

Habitat Suitability Index (HSI) values generated by the model range from 0 for areas with no value as winter habitat to 1.3 for optimal habitat. An HSI of 1.0 represents a habitat capability of 100 deer per square mile. These values are used to estimate changes that result from timber harvest and do not reflect actual known deer numbers; they are used only for comparing potential impacts to habitat capability among timber harvest alternatives and for assessing cumulative impacts of timber harvest. Further, it should be noted that the habitat capability model assumes that all timber harvest is accomplished using traditional even-aged (clearcut) silvicultural systems. However, other silvicultural systems (uneven-aged or two-aged) would be used on some harvest acres for this project, depending on alternative (Table 3-3, Silviculture and Timber Management section). Although the effects of these alternative harvest methods on deer habitat capability are currently unknown, results of the model may overestimate the impact of this type of timber harvest on deer habitat capability.

#### Effects of Timber Harvest

The deer model estimated current habitat capability in the project area at 95 percent of the habitat capability that existed on National Forest System lands on Gravina Island prior to any timber harvest. These numbers are slightly different than the Forest Plan (Forest Plan FEIS, p. 3-371) due to updated project GIS coverages, but trends are similar. As was done in the Forest Plan (Forest Plan FEIS, page 3-368), the Gravina project analysis assigned non-National Forest System land ownerships a zero habitat capability (worst-case scenario). This underestimates the current capability of these lands, but assumes that the habitat value will decline as future development takes place.

Regardless of alternative, deer habitat capability would be changed by approximately 1 percent for the first 25 years after harvest (Table 3-55). The action alternatives propose harvesting timber that would result in a 4 to 9 percent reduction in long-term habitat capability (stem exclusion stage) on National Forest System lands, (Table 3-55). Among the action alternatives, Alternative 4 would have the greatest impact on project-area habitat capability, and Alternatives 5 and 6 would have the least. Alternatives 2 and 3 would have intermediate impacts; of these, Alternative 3 would protect slightly more deer habitat capability than Alternative 2.

The deer model generated HSI scores ranging from 0.0 to 1.30. HSI scores for the best 25 percent of the acres ranged from 0.39 to 1.3. Alternative 4 proposes harvesting the most, approximately 876, of these top-quality acres. Alternative 6 propose harvesting 308 acres from this category, the least of any action alternative. Alternatives 2, 3, and 5 propose harvesting approximately 657, 550, and 432 acres within the top 25 percent of available habitat. Figure 3-16 shows groups of HSI scores for the project area.

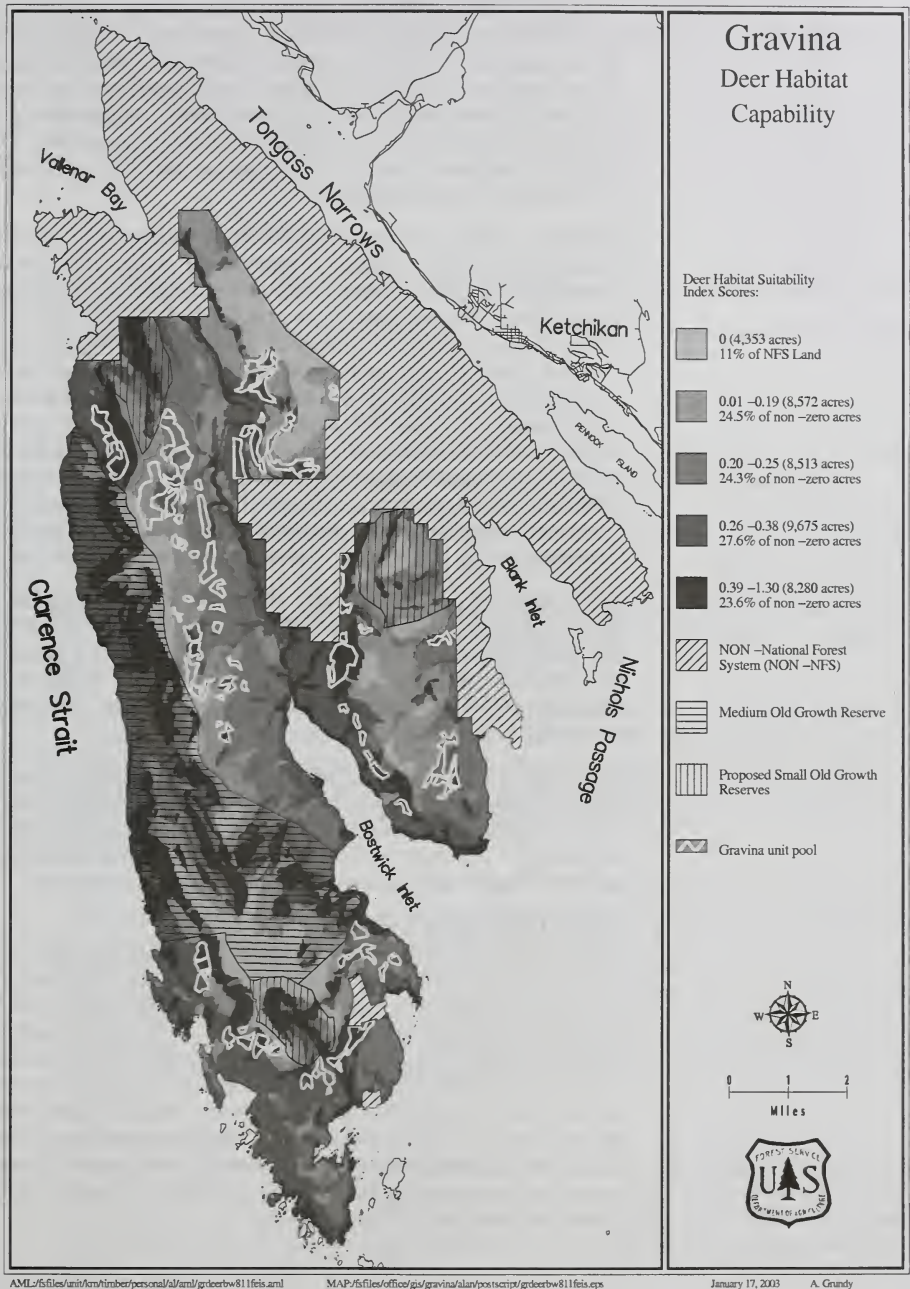
Table 3-55  
Effects of Proposed Timber Harvest on Existing Deer Habitat Capability<sup>1</sup>

Alternative	Change After Harvest	Change by Stem Exclusion Stage
1	0%	0%
2	+<1%	-7%
3	+<1%	-6%
4	+<1%	-9%
5	-<1%	-4%
6	+1%	-4%

<sup>1</sup>Deer model Habitat Suitability Indices using 100 deer per square mile. NFS land only – private land modeled as 0 habitat capability.

Source: GIS, Grundy 2003

Figure 3-16  
Existing Gravina Island Project Area Deer Habitat Capability



Source: GIS, Grundy, 2003

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## Effects of Road Access

Roads and associated increases in access can impact deer populations by facilitating increases in both legal harvest and illegal poaching (Forest Plan Final EIS, p. 3-310). Gravina Island (WAA 101) is an important hunting area for Ketchikan, Metlakatla, and Saxman deer hunters. Current access for hunting is via boat or airport ferry, and most hunting is done on foot. Access to most of WAA 101 is currently limited, and most hunting probably occurs within 1 mile of shoreline on the east side of the island, as well as in the vicinity of Blank and Bostwick Inlets and Vallenar Bay. Most areas in the interior and the west side of Gravina Island receive relatively little hunting pressure because they are less accessible. These areas may serve as refuge for some deer during the hunting season, and they may function as population sources for the more heavily hunted areas.

Deer harvest in WAA 101 would undoubtedly increase if a road system is constructed on National Forest System lands on Gravina Island. Increased human access would likely have a greater impact on deer numbers than would reductions in deer habitat capability resulting from timber harvest. No roads are proposed under Alternatives 1 and 5. Alternatives 2, 3, 4 and 6 propose the construction of 17.4 to 22.2 miles of road, mostly in the central part of WAA 101, which could also provide access to more of the western part of the island. Alternatives 3, 4, and 6 propose a road through non-National Forest System lands that would connect to a new road proposed to be built by Ketchikan Gateway Borough. This new road would connect to an existing land-to-barge bulkhead facility in Tongass Narrows north of the airport. A portion of this road (1.65 miles) would be built by the Forest Service if the Borough has not constructed it at the time of proposed harvest. These miles are in addition to those listed above. Alternative 2 proposes a road that would terminate at a proposed LTF in Bostwick Inlet and would not connect to non-National Forest System lands on the eastern side of Gravina.

In Alternatives 2, 3, and 6, all roads on National Forest System lands would be physically closed to motorized vehicles after timber harvest is completed. Nonetheless, these roads would facilitate increased walk-in access that would likely result in increased harvest of deer. Of the three, the road system proposed for Alternatives 3 and 6 would result in a greater increase in access because of its proximity to Ketchikan and because of the easy connection provided by the existing airport ferry.

In Alternative 4, the mainline road would remain open after timber harvest to provide increased access. Among the action alternatives, Alternative 4 would provide the greatest increase in access to currently inaccessible areas and would result in the greatest increase in harvest of deer in WAA 101. Although impossible to quantify with existing information, it is likely that harvest of deer would increase significantly under this alternative.

## Hunter Demand for Deer

Between 1992 and 2001, hunters harvested an estimated average of 143 deer annually from WAA 101 (ADFG 2001 Deer Hunter Survey Summary Statistics). This hunter demand for deer represents about 8 percent of current deer habitat capability in WAA 101 (Table 3-56). Potential development of non-National Forest System lands could place even more demand upon forest habitat. Based on Forest Plan projections, hunter demand is expected to increase 18 percent over each of the first two decades and 15 percent over each of the following three decades (Forest Plan FEIS, page 3-528). Rural harvest is approximately 8 percent of total harvest (Forest Plan FEIS, page H-78). Using those predictions, hunter demand would equal 229 deer at the time the proposed units enter the stem exclusion stage at about year 2035. Forest Plan projections for hunter demand in WAA 101 is 302 deer at the year 2095 (end of rotation) (Forest Plan FEIS, page H-78).



Table 3-56  
Relationship Between Deer Habitat Capability and Hunter Demand on Gravina Island

Year	Hunter Demand as Percent of Habitat Capability <sup>1</sup>		
	Rural Hunters	Ketchikan Hunters	All Hunters
Current	<1%	7%	8%
10 years after harvest <sup>2</sup>	<1%	9%	9%
Stem exclusion <sup>3</sup> : Alt. 1	1%	12-16%	13-17%
Alt. 2	1%	13-17%	14-18%
Alt. 3	1%	13-17%	14-18%
Alt. 4	1-2%	13-17%	14-19%
Alt. 5	1%	12-16%	13-17%
Alt. 6	1%	12-16%	13-17%

<sup>1</sup>Habitat capability as predicted by the interagency deer model. Private land modeled as 0 habitat capability per TLMP FEIS page 3-528.

<sup>2</sup>The model predicts approximately one percent change under all alternatives in deer habitat capability during the first 10 years after harvest.

<sup>3</sup>30 - 50 years after harvest.

Source: A. Grundy, GIS, C. Tighe, calculations, 2002

A deer population at carrying capacity should be able to support a sustainable hunter harvest (demand) of approximately 10 percent of the habitat capability while also providing a reasonably high level of hunter success (Forest Plan Final EIS, p. 3-596). Hunter success can be expected to decline in areas where demand represents 10 to 20 percent of habitat capability. If demand exceeds 20 percent of habitat capability, harvest of deer by hunters may be directly or indirectly restricted (Forest Plan Final EIS, p. 3-537). Based upon habitat capability for National Forest System lands only, current deer demand is approaching the level at which not all hunters may be successful, or may have to spend more effort to harvest deer. Following a severe snow winter, demand for deer might not be met.

Among the action alternatives, projected hunter demand for deer would represent the greatest percentage of habitat capability under Alternative 4, followed in order of decreasing impact by Alternatives 2, 3, 6, and 5, respectively. With projected increases in the numbers of hunters, demand reaches 13 percent of habitat capability in 30 years and 17 percent over the next 50 years even under Alternative 1 (no action). At some future point, harvest may be either directly or indirectly limited.

Forest Plan projections of hunter demand for deer were based solely on projected increases in human population; they did not account for changes in access. Therefore, on Gravina Island, increases in demand could be greater than predicted. As described above, this could lead to unsustainable levels of deer harvest on Gravina Island. Opportunities to coordinate with ADFG and other agencies in developing alternate management strategies may exist and should be explored. These include adjustments to hunting and trapping season lengths, reductions in harvest limits, and a hunter/trapper check station on Gravina Island. A joint study of the deer population of Gravina Island and monitoring the effectiveness of road closures should also be considered.

## Cumulative Effects on Deer

### Effects of Timber Harvest

Combined with previous timber harvest, implementation of the current project would result in a cumulative reduction in historical (prior to any timber harvest) deer habitat capability on the project area of 5 to 13 percent, depending on the alternative (Table 3-57). There are no other "reasonably foreseeable" future timber sales scheduled on National Forest System lands on Gravina Island at this time.

**Table 3-57**  
Effects of Proposed Timber Harvest on Historical (1954) Deer Habitat Capability<sup>1,2</sup>

	Harvest Acres	Percent Change from 1954 Deer Habitat Capability
Acres of past timber harvest	628 <sup>3</sup>	N/A
Existing deer habitat capability	N/A	-5%
Alt. 1	0	-5%
Alt. 2	1,801	-12%
Alt. 3	1,818	-11%
Alt. 4	2,218	-13%
Alt. 5	803	-9%
Alt. 6	1,562	-9%

<sup>1</sup> Deer model Habitat Suitability Indices (HSIs) range from 0.0 to 1.3; HSI = 1.0 represents 100 deer per square mile, private land modeled as 0 habitat capability as in Forest Plan Final EIS.

<sup>2</sup> Effects calculated for "stem exclusion stage", or year 26 after harvest.

<sup>3</sup> NFS acres; an additional 419 acres of harvest has occurred on private land.

Source: A. Grundy, GIS, 2002

Alaska Department of Natural Resources (DNR) is planning to harvest up to 20.5 MMBF of timber volume, from approximately 800 acres of DNR-managed lands on Gravina Island, between 2005 and 2012. DNR estimates that an additional 825 MBF (39 acres) could be harvested from Alaska Mental Health Trust lands and 7 MMBF (280 acres) could be harvested from University of Alaska lands on Gravina Island. Since non-NFS lands were modeled as having zero habitat capability, the cumulative effect of this harvest with the project alternatives is the same as displayed in Table 3-57.

## Effects of Road Access and Hunter Demand for Deer

Regardless of the alternative selected by the Forest Service, expanded access to the interior of Gravina Island is likely in the foreseeable future, as a result of proposed activities on other ownerships. A timber sale on State lands will require an access road from the interior of Gravina Island to the Tongass Narrows for log transport. In Alternatives 3, 4, and 6, DNR would tie their road system to the National Forest System road; in Alternatives 1, 2, and 5, it is likely that DNR would construct their own connecting road from the Borough-airport road system to State lands.

In the Gravina Access Project Draft EIS (August 2003), the preferred alternative (F-1) is to construct bridges between Ketchikan and Gravina Island via Pennock Island, and a connecting road to the airport. Conceptually, this road would tie into an airport-Borough road network along the Tongass Narrows (as described in the Borough's Gravina Comprehensive Plan and Area Plans). Should a "hard-link access" alternative be selected, the associated industrial, commercial, and residential development would result in roaded access through much of the non-National Forest System lands on the eastern side of Gravina Island.

The cumulative effect of road systems on Borough, State, and National Forest lands is likely to substantially increase hunting pressure on deer on Gravina Island. This increase in pressure would be intensified if Ketchikan hunters continue to be restricted from hunting deer on Prince of Wales Island during a portion of the season. As described under Direct and Indirect Effects above, the increased access provided by an open road system in Alternative 4 could lead to unsustainable levels of deer harvest in WAA 101, given current deer harvest regulations and bag limits. But even with no timber harvest on National Forest System lands, hunter demand is predicted to be 13 percent of the habitat capability in 30 years and 17 percent over the next 50 years. At some future point, harvest may be either directly or indirectly limited. The impact of increased competition would affect Ketchikan hunters the most, since Ketchikan is not a rural

community and sport hunting would be restricted before subsistence hunting (Forest Plan Final EIS, page 3-597).

## Alexander Archipelago Wolf

The Alexander Archipelago wolf was chosen as an MIS because of population viability concerns and because trappers and hunters in Southeast Alaska actively pursue this subspecies of gray wolf. A recent decision by the U. S. Fish and Wildlife Service not to list this subspecies as threatened under the Endangered Species Act was based in large part on the Forest Service's commitment to enhance habitat protection and population monitoring for the wolf. In Southeast Alaska, wolves inhabit the mainland and most large islands south of Frederick Sound. The population has been estimated at fewer than 1,000 individuals (Person, et.al. 1996), and approximately 200 to 250 are harvested annually (Kirchhoff 1991, D. Person, pers. comm.). One wolf pack is known to occur on Gravina Island, and it is unlikely that any other packs exist on the island. An active wolf den was located in the project area in 1998 and 1999. This den was not active in 2000, and the current den has not yet been located.

The Wolf Conservation Assessment identified three key issues that influence wolf populations in Southeast Alaska: 1) the loss of long-term carrying capacity for deer due primarily to timber harvesting, 2) higher wolf mortality associated with increased human access from roads, and 3) continued high levels of wolf harvest by humans (Person et al. 1996). Similarly, the Forest Plan identified the maintenance of adequate deer habitat capability and the control of road density and human access as key factors important for maintaining viable, well-distributed wolf populations (Forest Plan Final EIS, p. 3-356). Both sources above agreed that maintaining long-term deer habitat capability is the most important consideration for wolf population viability.

### Wolf-Deer Interactions

Sitka black-tailed deer are the principal prey of Alexander Archipelago wolves, and long-term viability of wolves is dependent on long-term deer habitat capability (Forest Plan Final EIS, Appendix N, p. N-30). For the Gravina project's wolf habitat analysis, only winter habitat capabilities calculated from the deer model and expressed as deer per square mile were considered. Person et al. (1996) recommended that, in areas where wolves prey primarily on deer, adequate habitat to support a minimum density of 13 deer per square mile should be maintained to provide for current levels of deer harvest by hunters, trappers, and wolves. Person et al. (1997) recommended that maintaining habitat capability for 18 deer per square mile would be likely to support the density of deer necessary to provide a 95 percent probability of the persistence of stable deer and wolf populations, given current levels of deer harvest by humans. Eighteen deer per square mile was used for this analysis to be consistent with the Tongass National Forest Annual Monitoring and Evaluation Report for Fiscal Year 2000 (USDA Forest Service 2001). The same model outputs described in the deer section were used for the wolf habitat analysis. Impacts to deer habitat capability are greatest during the stem exclusion stage; the analysis below reflects these impacts.

## Direct and Indirect Effects on Wolves

### Effects of Timber Harvest

Current deer habitat capability is estimated at approximately 20 deer per square mile in the project area, 95 percent of the historical capability. The habitat capability numbers reflect the capability during the winter because winter is the limiting season for deer. Therefore, the land area used to calculate the density is also the winter habitat, which is considered to be below 1,500 feet elevation. The action alternatives for the Gravina Island project would reduce current habitat capability (Table 3-58). Under no alternative would the proposed timber harvest reduce deer density below the recommended level of 18 deer/square mile needed to support both wolves and the current hunter demand (Forest Plan, page 4-116). The impacts of the proposed timber harvest on deer habitat capability would be greatest under Alternative 4, followed, in order of decreasing impact, by Alternatives 2, 3, 6, 5, and 1.



Table 3-58  
Effects of Proposed Timber Harvest on Wolves in Terms of Deer Density<sup>1</sup>

	Estimated Deer Per Square Mile <sup>2</sup> Below 1,500 feet elevation	
	NFS lands only <sup>3</sup>	Project Area <sup>3</sup>
Existing (and Alt. 1)	33	20
Post-harvest	32-33	20
Stem exclusion <sup>4</sup> : Alt. 1	33	20
Alt. 2	30	19
Alt. 3	31	19
Alt. 4	30	18
Alt. 5	31	19
Alt. 6	31	19

<sup>1</sup>Deer model Habitat Suitability Indices (HSIs) range from 0.0 to 1.3, HSI = 1.0 represents 100 deer per square mile, and the wolf predation correction factor was not applied.

<sup>2</sup>These numbers are presented for comparison purposes only; they do not reflect actual, known numbers of deer.

<sup>3</sup>NFS land below 1,500 feet elevation = 35,305 acres; total land below 1,500 feet elevation = 57,064 acres

<sup>4</sup>There is essentially no change in habitat capability in years 0-25 after harvest (less than 1 percent under all alternatives).

Source: A. Grundy, GIS, 2002

## Effects of Road Density

Roads are another source of potential effects of timber harvest activities that can impact populations of deer and wolves. There are currently no open roads on National Forest System lands on Gravina Island. Approximately 1.8 miles of open road are associated with the airport. Four of the five action alternatives propose building roads to harvest timber. Roads, open or closed, increase human access in areas where roads were historically absent, especially when built in close proximity to human population centers. Roads may increase both legal harvest and illegal poaching of wildlife (Forest Plan Final EIS, p. 3-310). In Southeast Alaska there is a clear relationship between road density and harvest of wolves. Person reported that wolves in GMUs 2 and 3 experienced higher mortality from hunting and trapping in WAAs with higher road densities, and that harvest of wolves by humans increased twofold in WAAs where road density exceeded 0.7 miles per square mile (Person, et.al. 1996). Current analyses of more recent data suggest that the correlation is strengthened for wolves where road systems are highly connected to other road systems or to human population centers (Person, unpub data).

There is a concern that a road system on Gravina Island could lead to the extirpation of the single wolf pack known to occupy the island (Person, pers. comm.). The possibility of re-colonization from other areas is questionable. Revillagigedo Island and Annette Island are the closest points from which wolves could access Gravina Island. From Revillagigedo, wolves would have to travel through Ketchikan or its inhabited outlying areas to access Tongass Narrows and swim to Gravina. Person, et. al. (1996) states that dispersal of wolves between islands is probably restricted by water barriers. Although wolves in Southeast Alaska are capable of swimming up to 2.5 miles, dispersal among major island groups in the archipelago is impeded by currents, high frequency of storms, shapes and distribution of land masses, and distance.

Forest-wide viability of the species would not be jeopardized if the Gravina Island pack is lost to hunters and trappers. Potential extirpation would be most likely under Alternative 4, which proposes an open road system that would connect to Tongass Narrows. Alternatives 3 and 6 propose similar road systems connecting to the Tongass Narrows, but the roads would be closed to motorized vehicles after timber harvest is completed; human access would still be increased over historical levels by expanding walk-in areas. Alternative 2 proposes a road that would connect to Bostwick Inlet but not to the Tongass Narrows.

Alternatives 2, 3, 4 and 6 propose construction of 17.41 to 22.24 miles of new road on National Forest System lands and other ownerships (Table 3-59). The Ketchikan Gateway Borough plans to build a road from the airport to the Pacific Log and Lumber sawmill; the project would use 1.65 miles of this road to access the Tongass Narrows. If the Borough did not build this road by the time the Forest Service offered a sale, the Forest Service would build this connecting segment of road. Combined with the existing road at the airport, Alternatives 2, 3, 4, and 6 would result in road densities between 0.22 and 0.27 mile per square mile during the active logging phase. In Alternatives 2, 3, and 6, all roads would be physically closed to motorized vehicles after timber harvest, decreasing the open road density to pre-harvest levels. In Alternative 4, 15.6 miles of mainline road would remain open after timber harvest. No new road construction is proposed in Alternatives 1 or 5. Regardless of the alternative, road densities on Gravina Island would remain below 0.7 miles per square mile, which is identified in the Forest Plan as the recommended level in areas with wolf mortality concerns (Forest Plan, page 4-116).

**Table 3-59**  
**Proposed Road Construction and Open Road<sup>1</sup> Densities for Gravina Island/WAA 101**

Road (miles)	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
Existing open road <sup>1</sup> (non-NFS lands)	1.8	1.8	1.8	1.8	1.8	1.8
Proposed Borough road construction (to be used in the project)	0	0	1.65	1.65	0	1.65
Proposed NFS road construction (all ownerships)	0	20.04	22.08	22.24	0	17.41
Open road density during project implementation <sup>1,2</sup>	0.02	0.23	0.27	0.27	0.02	0.22
Post-harvest open road <sup>1,3</sup> (all ownerships)	1.8	1.8	3.45	19.05	1.8	3.45
Post-harvest open road density <sup>1,2,3</sup>	0.02	0.02	0.04	0.20	0.02	0.04

<sup>1</sup> Open roads are maintained for use by motorized vehicles; see Table 3-18, Transportation section.

<sup>2</sup> Road density is calculated as linear miles of road per square mile of land.

<sup>3</sup> Does not include temporary roads because they would be closed after harvest.

Source: C. Tighe, 2004

Alternatives 2, 3, 4, and 6 propose building a road near a wolf den that was known to be active in 1998 and 1999, but that was inactive in 2000 to 2003. Alternate road locations were explored and found to be impractical. High levels of wolf activity were documented in the spring of 2000 in the vicinity of this den, but the new den was not located. Under all alternatives, the road would meet Forest Plan Standards and Guidelines, which prohibit road construction within 600 feet of known active dens (Forest Plan, page 4-117). Although wolves occasionally den in close proximity to roads, it is possible that road construction and/or timber harvest activities could cause the Gravina Island wolf pack to select a different denning location. Restrictions on the seasonal timing of roadbuilding activities to avoid the denning season (mid-April to early July) may help minimize or mitigate this possibility.

Perhaps even more important than road density is the probable impact that roaded access would have on Gravina Island deer populations. As described above, deer harvest would likely increase if an open road system is constructed on Gravina, especially if Ketchikan hunters continue to be restricted from hunting deer on Prince of Wales Island during a portion of the season. It is possible, therefore, that deer numbers on Gravina Island could be reduced to levels below those estimated as adequate to support a sustainable harvest of deer by both humans and

wolves. This would be most likely under Alternative 4, which proposes a road system that would remain open after harvest is completed.

## Human Harvest of Wolves

In GMU 1, which includes Gravina Island, hunters may legally harvest five wolves each between August 1 and April 30. Wolves may also be trapped in GMU 1 from November 10 to April 30; there is no bag limit for trapping. Between 1986 and 2001, 25 wolves (1.6 per year) were legally harvested from Gravina Island (ADFG, unpub. data). During 1999, 2000, and 2001, 3, 2, and 4 wolves, respectively, were legally harvested from Gravina. In 1992, 6 wolves were harvested from Gravina (ADFG, unpub. data).

The number of wolves in a pack varies seasonally and among years. Packs on adjacent Revillagigedo Island averaged 5.4 wolves (Smith, et al. 1987); those on Prince of Wales and Kosciusko Islands averaged 7 to 9 (Person et al. 1996). The size of the Gravina Island pack is unknown, but harvest records suggest that in some years, hunters and trappers may harvest most of the pack. As described above, a road system on Gravina would probably result in increased harvest of wolves and, therefore, a higher likelihood that in any given year the entire pack could be harvested. This likelihood would be greatest under Alternative 4, followed in order of decreasing impact by Alternatives 3, 2, 6, 5, and 1.

## Cumulative Effects on Wolves

### Effects of Timber Harvest

Prior to timber harvest, which occurred in the mid to late 1950s, National Forest System lands on Gravina Island had an estimated habitat capability of 21 deer per square mile. As described in the deer section (above), timber harvest is likely to occur on State lands on Gravina Island. Table 3-58 summarizes the potential impacts to deer habitat capability for Gravina Island (WAA 101) as a whole, with a worst-case scenario (zero value) estimated for non-National Forest System lands. Under all action alternatives, habitat capability would remain at or above the 18 deer per square mile during the stem exclusion stage.

Habitat capability estimates do not include a factor for the projected increase in hunting/trapping pressure that would result from increased road access under the Gravina Access Plan. The cumulative impacts of proposed timber harvest on deer habitat capability would be greatest under Alternative 4, followed, in order of decreasing impact, by Alternatives 2, 3, 5, 6, and 1. The habitat capability in WAA 101 will be about 17 deer per square mile in the project area below 1,500 feet elevation if all suitable lands are harvested by the end of rotation. This also assumes that other ownerships have zero habitat value. No other "reasonably foreseeable" timber harvest activities are scheduled on National Forest System lands on Gravina Island at this time, so this worst-case scenario is unlikely to happen.

### Effects of Road Density and Human Harvest

Reasonably foreseeable actions on other ownerships would substantially increase road densities on Gravina Island. The preferred alternative for the Gravina Access Plan Draft EIS proposes to construct 2.7 miles of road on Gravina from the bridge to the airport, and the Ketchikan Gateway Borough proposes to build a total of 2.5 miles of road from the airport to the Pacific Log and Lumber sawmill to the north. Additionally, DNR may build approximately 14.7 to 17.9 miles of road in the interior of Gravina Island for State timber sales, depending on the alternative selected by the Forest Service (Table 3-20, Transportation section). DNR generally closes their roads after completion of timber sale activities. Under Alternative 4, the cumulative post-harvest open road density on Borough, State, and National Forest System lands on Gravina Island would be 0.24 mile per square mile. If DNR left their roads open, the cumulative road density would rise to 0.39 to 0.42 mile per square mile for Alternative 4. All these situations are below the recommended level of 0.7 mile per square mile, but would provide driving access to National Forest System lands from a population center.

Impacts from the proposed bridge linking Gravina to Ketchikan could be greater than anticipated. This "hard link" would provide additional access to the island and lead to additional roads and development of non-National Forest System lands. This, combined with a



road system on National Forest System lands and projected increases in deer hunting, trapping, and subsistence, could result in substantial impacts to deer and wolf populations within several decades. Populations could become dependent on the remaining unroaded areas on National Forest System lands in the western and southern portions of the island.

## American Marten

The American marten was chosen as an MIS because it represents species requiring old-growth habitat. Like deer, marten are dependent on high-quality winter habitat, which consists of low-elevation (below 1,500 feet), high-volume old-growth forest, especially in coastal and riparian areas. These habitats intercept snow, provide cover and denning sites, and provide habitat for prey species.

Gravina Island is part of the Revillagigedo Island/Cleveland Peninsula biogeographic province, which is considered a high-risk province for marten habitat (Forest Plan, p. 4-118). In such areas, timber harvest units that contain high-value marten habitat must meet specific Forest Plan Standards and Guidelines. Because less than 33 percent of the original POG forest has been harvested in each of the five VCUs in the project area, standards and guidelines include retaining 1) 10-20 percent of the original stand structure, 2) an average of at least four large trees (20-30 inch DBH or greater) per acre for future snag recruitment, 3) an average of at least three large decadent trees per acre, and 4) an average of at least three pieces per acre of down material (logs 20-30 inches or greater in diameter and 10 feet long), generally distributed throughout the harvest unit. Retained trees should have a reasonable assurance of windfirmness and should be uniformly distributed throughout the stand, but they may be clumped for operational concerns or ecological opportunities (Forest Plan, p. 4-119).

### Marten Habitat Modeling

As for deer, an interagency model (Suring et al. 1992) was developed to evaluate marten habitat capability. The model calculates HSIs based on timber volume strata (high, medium, low), elevation, and typical snowfall. Low-elevation, high-volume old-growth stands, especially in beach fringe or riparian areas with low snowfall, provide the best marten winter habitat. HSI values range from 0.0 in areas that have no winter habitat value to 1.0 in optimal habitat. These values are used to calculate theoretical numbers of marten that particular habitat types can be expected to support and to estimate changes in habitat capability that result from timber harvest. A multiplier of 2.71 marten per square mile is used to convert HSI values into habitat capability numbers. Other ownerships are assigned a zero habitat capability (worst-case scenario).

The model yields estimates of habitat carrying capacity, which do not reflect actual marten numbers; the estimates are used only for comparing potential impacts to habitat capability among alternatives and for assessing cumulative impacts of timber harvest. The habitat capability model assumes that all timber harvest is accomplished using traditional even-aged (clearcut) silvicultural systems. Other systems (uneven-aged or two-aged), which may have less impact on marten habitat capability, would be used on a portion of the harvested acres for the project (see Table 3-3, Silviculture and Timber Management section). Although the effects of these alternative harvest methods on marten habitat capability are currently unknown, results of the model are likely to overestimate the impact of this type of timber harvest on habitat capability, especially with implementation of Forest Plan Standards and Guidelines.

## Direct and Indirect Effects on Marten

### Effects of Timber Harvest

The action alternatives propose harvesting timber that would result in a 2 to 8 percent reduction in current marten habitat capability across the project area (Table 3-60). Most impacts to marten capability would be within VCUs 7610 and 7630. VCU 7610 would be reduced by nearly one-third of its current capacity under Alternative 4. Some minor harvest would occur within marten habitat in VCUs 7640 and 7650, but not enough to reduce the marten habitat capability. VCU 7620 is dominated by the medium old growth reserve. Among the action alternatives, Alternative 4 would have the greatest impact on marten habitat capability and Alternative 5 would have the least. Alternative 6 would have slightly greater impact than

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Alternative 5. Alternatives 2 and 3 would have intermediate and approximately equal impacts on marten habitat.

Table 3-60  
Effects of Proposed Timber Harvest on American Marten Habitat <sup>1</sup>.

		VCU 7610	VCU 7620	VCU 7630	VCU 7640	VCU 7650	Project Area
Percent Change in Habitat Capability, Given:	Alt. 1	0	0	0	0	0	0
	Alt. 2	- 14%	0%	- 12%	0%	0%	- 7%
	Alt. 3	- 14%	0%	- 12%	0%	0%	-7%
	Alt. 4	- 29%	0%	-12%	0%	0%	- 8%
	Alt. 5	0%	0%	-4%	0%	0%	- 2%
	Alt. 6	- 14%	0%	-4%	0%	0%	- 3%

<sup>1</sup>Marten model Habitat Suitability Indices (HSIs) range from 0.0 to 1.0, HSI = 1.0 represents 2.71 marten per square mile.

Source: J. Zelenak, D. Fisher, GIS, 2000

#### Effects of Road Density

Marten are easily trapped and can be over-harvested, especially where trapping pressure is heavy and not effectively controlled. This corresponds closely to the availability of road access. Because of their susceptibility to trapping, marten densities decline in areas where open road densities exceed 0.2 miles per square mile. Marten densities may be reduced by as much as 90 percent when open road densities approach 0.6 miles per square mile (Suring et al 1992). There are only 1.8 miles of open road on Gravina Island currently, and marten harvest is currently low. No marten have been reportedly harvested from Gravina since 1999 (ADFG, unpubl. data). Alternatives 2, 3, 4, and 6 would result in open road densities between 0.22 and 0.27 mile per square mile (Table 3-59, above) during the active logging phase. In Alternatives 2, 3, and 6, all roads would be physically closed to motorized vehicles after timber harvest, decreasing the open road density to pre-harvest levels. In Alternative 4, 15.6 miles of mainline road would remain open after timber harvest, resulting in an open road density of 0.20 mile per square mile.

#### Cumulative Effects on Marten

##### Timber Harvest

Combined with previous timber harvest, implementation of the project would result in a cumulative reduction in historical (1954) marten habitat capability on Gravina Island of 13 to 19 percent, depending on the alternative (Table 3-61). Alternative 4 poses the greatest potential impact on marten habitat, followed by Alternatives 2 and 3, 6, 5, and 1, respectively. There are no other "reasonably foreseeable" timber sales scheduled on National Forest System lands in the project area at this time.

Timber harvest on non-National Forest System lands on Gravina Island is likely over the next 5 to 15 years (Table 3-9, Silviculture and Timber Management section). However, these lands were given a zero habitat value during analysis, so there would be no additional effects beyond what has already been presented in the direct and indirect effects section.

Table 3-61  
Cumulative Effects of Proposed Timber Harvest on American Marten Habitat<sup>1</sup>

	Percent Reduction in Habitat Capability Since 1954					
	VCU 7610	VCU 7620	VCU 7630	VCU 7640	VCU 7650	Project Area
Existing	36%	18%	7%	0%	0%	12%
Alt. 1	36%	18%	7%	0%	0%	12%
Alt. 2	45%	18%	19%	0%	0%	18%
Alt. 3	45%	18%	19%	0%	0%	18%
Alt. 4	55%	18%	19%	0%	0%	19%
Alt. 5	36%	18%	11%	0%	0%	13%
Alt. 6	45%	18%	11%	0%	0%	15%

<sup>1</sup>Marten model Habitat Suitability Indices (HSIs) range from 0.0 to 1.0, HSI = 1.0 represents 2.71 marten per square mile.

Source: GIS, Reeck 2002.

## Effects of Road Density

Reasonably foreseeable actions on other ownerships would increase road densities on Gravina Island. The proposed bridge linking Gravina Island to Ketchikan would provide additional access and, if implemented, would likely lead to additional roading and development of non-National Forest System lands on Gravina. The preferred alternative for the Gravina Access Plan Draft EIS proposes to construct 2.7 miles of road on Gravina from the bridge to the airport, and the Ketchikan Gateway Borough proposes to build a total of 2.5 miles of road from the airport to the Pacific Log and Lumber sawmill to the north. Additionally, DNR may build 14.7 to 17.9 miles of road in the interior of Gravina Island for State timber sales (Table 3-20, Transportation section). DNR generally closes their roads after completion of timber sale activities. Under Alternative 4, the cumulative post-harvest open road density on Borough, State, and National Forest System lands on Gravina Island would be 0.24 mile per square mile. If State roads were to remain open, the open road density would be 0.39 to 0.42 mile per square mile. This is above the 0.2 mile per square mile level under which marten densities begin to decline (Suring et. al 1992). However, it is below the 0.6 mile per square mile level that Suring et. al. (1992) found to have potential for profound declines (up to 90 percent) in marten densities. State lands were considered to have zero habitat capability, so the additional roads on those lands can not cause a further decline in the habitat capability presented here. Due to their susceptibility to trapping, marten populations could become dependent upon habitat within the remaining unroaded areas on National Forest System lands in the western and southern portions of the island.

## Other Wildlife Concerns

### Endemic Terrestrial Mammals

The Forest Plan requires an evaluation of the existence of rare or endemic terrestrial mammals that may represent unique populations with restricted ranges. No surveys were conducted specifically for this project. However, researchers with the University of Alaska Museum, Fairbanks, conducted numerous surveys on the Ketchikan/Misty Fiords Area between 1993 and 1999 (McDonald and Cook 1999). Small mammal trapping surveys representing 600 trap nights were conducted in the project area near Phocena Bay (A. Runck, pers. comm.). Species trapped included Keen's mouse (*Peromyscus keeni*), dusky shrew (*Sorex monticolus*), and red squirrel (*Tamiasciurus hudsonicus*). Other species from Gravina Island in the University of Alaska Museum collection include the common shrew (*Sorex cinereus*), northern bog lemming (*Synaptomys borealis*), and American marten. Although none were trapped, there is potential for the occurrence of northern flying squirrels (*Glaucomys sabrinus*) and ermine (*Mustela erminea*) in the project area (A. Runck, pers. comm.). Mink (*Mustela vison*) and river otters (*Lutra canadensis*) have also been observed in the project area. No rare or endemic terrestrial mammal populations have been identified in the project area. Therefore, there should be no impact and they are not discussed further.



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## Bald Eagles

There are 67 documented bald eagle nests on Gravina Island, 17 of which occur on National Forest System land. Those on National Forest System land are protected within the 1,000-foot beach and estuary buffers. Each nest also receives protection under an Interagency Agreement between the Forest Service and the USFWS. A minimum 330-foot habitat management zone is established around each nest. In addition, the agreement places seasonal timing and activity restrictions for repeated helicopter flights within a quarter mile of active nests and for road blasting activities within half a mile of active nests. All nests potentially affected by such activities would be monitored to determine if breeding eagles are present prior to road building or timber harvest.

## Log Transfer Facilities and Camps

A new log transfer facility in Bostwick Inlet is proposed in Alternative 2. There are two types of effects associated with a log transfer facility and any associated camps. The first is the direct loss of habitat due to clearing areas for a camp, sortyard, and associated facilities, but the amount of habitat lost is relatively minor. The Gravina Island project should not have an associated camp due to its proximity to Ketchikan. Whenever possible, facilities are located away from the highest-quality habitats such as eagle nest sites and estuarine habitat. The second effect is disturbance to, and possible harassment of, wildlife as a result of increased human activity. The overall effect on wildlife use patterns is generally minor, as most wildlife species adapt to short-term increased human activity. However, an increase in the number of people in an area generally increases the harvest levels of game animals. The influx of additional people into an area may have a greater effect on existing users of the area than on wildlife populations. For additional information on the effects of the proposed alternatives on subsistence users, see the Subsistence section of this chapter.

## Subsistence

The following analysis is based on the detailed subsistence information and analyses contained in the 1997 Forest Plan Final EIS (Chapter 3, Appendix H, and Deer Harvest Maps). Federal management of fisheries resources in Federal reserved waters commenced on October 1, 1999. Federal management of subsistence resources other than fish commenced on July 1, 1990. The Marine Environment, Log Transfer Sites and Related Facilities, Watershed and Fisheries, and Wildlife sections of this chapter contain additional analyses of habitats and populations of marine species, fish, deer, and other wildlife species. The identification, protection, and interpretation of cultural and historic resources are addressed by other legislation, including the National Historic Preservation Act, and are discussed in the Heritage section of this chapter.

### Subsistence and ANILCA

Subsistence is a broad term applied to the use by rural Alaskans of many natural resources. The Alaska National Interest Lands Conservation Act (ANILCA, 16 USC Chapter 51) of 1980 requires that Federal agencies with jurisdiction over public lands in Alaska analyze subsistence resources and uses and evaluate potential effects of management activities on these resources and uses (ANILCA Sec. 810). This analysis typically focuses on food-related resources that are most likely to be affected by habitat alteration or loss associated with land management activities. The analysis usually addresses three factors related to subsistence uses: 1) resource distribution and abundance, 2) access to resources, and 3) competition for the use of resources. The evaluation determines whether subsistence uses within the project area or portions thereof may be significantly restricted by any of the proposed alternatives. The Alaska Land Use Council defines a significant restriction on subsistence uses as follows:

“A Proposed Action shall be considered to significantly restrict subsistence uses if, after any modification warranted by consideration of alternatives, conditions, or stipulations, it can be expected to result in a substantial reduction in the opportunity to continue uses of renewable resources. Reductions in the opportunity to continue subsistence uses generally are caused by: reductions in abundance of, or major redistribution of resources; substantial interference with access; or major increases in the use of those resources by non-rural residents.”

Under ANILCA, if it is concluded that land management activities (from a specific project or cumulatively for a geographic area) may impose a significant possibility of a significant restriction on subsistence resources or uses, additional analysis and findings are required. Such a finding requires that the Proposed Action 1) be modified to remove the significant restriction, 2) be dropped, or 3) proceed with the stipulation that formal subsistence hearings be held and subsequent findings published.

## Affected Environment

### Gravina Island Subsistence Resources and Uses

In Southeast Alaska, all communities except Juneau and Ketchikan are designated as rural communities under ANILCA. The Federal subsistence law states that only rural Alaska residents qualify for subsistence hunting and fishing on Federal lands. The only two rural communities with documented subsistence uses of Gravina Island and surrounding waters are Metlakatla and Saxman (Forest Plan Final EIS, p. 3-605, 3-641). Although Ketchikan does not qualify as a rural community under Federal law, Ketchikan residents do harvest subsistence resources from Gravina Island, especially deer. In the event of a restriction on the use of subsistence resources, rural residents would have priority over non-rural residents for the use of those resources on Federal lands.

Salmon and other finfish, shellfish, marine plants and mammals, terrestrial wildlife including deer and other mammals, as well as berries, cedar bark, and timber are all subsistence resources harvested by rural communities in Southeast Alaska. Metlakatla reported an average per capita

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use of 71 pounds of edible subsistence resources including salmon (28 percent), other finfish (23 percent), invertebrates (23 percent), deer (15 percent), and other resources (11 percent) (Forest Plan Final EIS, p. 3-603). Saxman reported an average per capita use of 89 pounds of edible subsistence resources including salmon (37 percent), other finfish (20 percent), deer (19 percent), and other resources (24 percent) (Forest Plan Final EIS, p. 3-639).

Metlakatla reported that WAA 101, along with WAA 303 (Duke Island) and WAA 1210 (southeast Prince of Wales Island), was among those that represented 75 percent of their average annual reported deer harvest (Forest Plan Final EIS, Appendix H, p. H-80). WAA 406 (Carroll Inlet) and WAA 1315 (Kasaan Peninsula, Prince of Wales Island) are the most important deer harvest areas reported for Saxman (Forest Plan Final EIS, Appendix H, p. H-88), but Gravina Island is also listed as an important area for subsistence for Saxman (Forest Plan Final EIS, p. 3-642). During project scoping, Metlakatla and Saxman residents reported harvest of and concern for subsistence resources on Gravina Island (WAA 101) and in adjacent estuarine and marine habitats. A majority expressed concerns about marine resources in Bostwick Inlet; other small bays around Gravina are also used.

### Environmental Consequences

#### Subsistence Use of Resources Other than Deer

During scoping, both Metlakatla and Saxman reported that Bostwick Inlet and Vallenar Bay are important subsistence areas, and that much of Gravina Island is used for various types and levels of subsistence harvest. Salmon and other finfish, harvested in freshwater and saltwater in and adjacent to the project area, are the most important subsistence resources for both communities (Forest Plan Final EIS, p. 3-603, 3-639). Other important resources mentioned during project scoping were Dungeness crabs, clams, mussels, kelp, and herring roe. In particular, both communities expressed concern over impacts to these resources resulting from construction and use of log transfer facilities in Bostwick Inlet and Vallenar Bay. Potential impacts to these resources are analyzed in the Marine Environment, Log Transfer Sites and Related Facilities and the Watershed and Fisheries sections in this chapter.

Both communities also reported harvesting berries and cedar bark from the project area. These activities have historically occurred along beach fringe areas, which are protected by the 1,000-foot beach buffer. Among other potential subsistence resources, the total reported numbers harvested since 1999 are: 3 beaver, 4 black bears, 0 marten, 27 river otters, and 9 wolves (ADFG unpub. data). Rural or non-rural hunters and trappers may have harvested these.

The distribution and abundance of the resources described above, and access to them, are not likely to be restricted by management activities related to the Gravina Island Timber Sale. Habitats for these species are not likely to be significantly impacted by project-related activities. However, competition for some resources could increase. Timber harvest would increase availability of berries in units in the short term but would decrease availability over the long term (especially after the stem exclusion stage begins). Proposed roads would increase access to some subsistence resources either temporarily or permanently depending on the selected alternative. Only under Alternative 4 would project roads remain open after timber harvest. Impacts of roads on several wildlife species are discussed in the Wildlife section in this chapter.

Competition for subsistence resources, especially with non-rural residents of Ketchikan, would likely increase as a result of an open road system in the project area. This is particularly likely if the National Forest System road was connected to a hard-link transportation system from Ketchikan to Gravina, as proposed in the Gravina Access Plan Draft EIS, and to the network of roads that are likely to occur on non-National Forest System lands as these lands are developed. For example, increased access to off-road berry picking and fishing could lead to competition between rural and non-rural users for these resources. This would most likely occur in areas



that have not been used historically for subsistence (timber harvest units and newly roaded areas).

## **Subsistence Use of Deer**

The Forest Plan Final EIS provided a comprehensive analysis of subsistence resources and potential effects of management activities, both Tongass-wide and for each rural community in Southeast Alaska. That analysis concluded that Forest-wide, under full implementation of the Forest Plan, the only subsistence resource that may be significantly restricted in the future by Federal forest management activities is subsistence use of deer (Forest Plan Final EIS, p. 3-224 to 3-229). Therefore, the remainder of this section focuses on the impacts of the proposed alternatives on the abundance and distribution of, access to, and competition for deer.

Subsistence use of deer is well documented for the rural communities of Southeast Alaska (Forest Plan Final EIS, pp. 3-210 to 3-223 and 3-523 to 3-528). Estimates of community use of specific WAAs for harvesting deer are reported in Appendix H of the Forest Plan Final EIS. As noted above, only Metlakatla reported that WAA 101 was among those WAAs representing 75 percent of the community's average annual reported deer harvest. From 1987 to 1995, Metlakatla residents reported an average subsistence harvest in this WAA of 10 deer per year (Forest Plan FEIS, pg. H-80), but ADFG hunter surveys show that Metlakatla residents averaged 18 deer per year between 1993 and 2001. Between 1992 and 2001, harvest on Gravina by all hunters averaged 143 deer per year. Ketchikan hunters harvested about 83 percent of the deer reported taken from WAA 101 during this time. It should be noted that the numbers reported above are estimates based on ADFG hunter surveys, which may not accurately represent actual deer harvest (ADFG 2002).

## **Direct and Indirect Effects**

### **Deer Distribution and Abundance**

Information on the distribution and abundance of deer in the project area is based primarily on the interagency deer habitat model, which estimates changes in winter deer habitat that result from timber management activities. Model results and the impacts of timber harvest on deer habitat are described in detail in the Wildlife section of this chapter. Declines in deer habitat are measurable and would eventually occur under all action alternatives in areas where timber is harvested. Changes in deer distribution and abundance would ultimately reflect loss of habitat from conversion of old-growth forest into second-growth stands by timber harvest.

The model assumes that timber harvest is accomplished using the traditional clearcut method. However, other silvicultural systems (uneven-aged or two-aged), which have less impact on deer habitat capability, would be used on 35 to 75 percent of harvested acres for the current project, depending on the alternative (Table 3-3, Silviculture and Timber Management section).

In the first 25 years following timber removal, some harvest units would increase in value as deer habitat by providing a flush of understory forage plants that would be available to deer, except under deep snow conditions. In such areas the abundance of deer may temporarily increase in response to increased food availability, and the distribution of deer may change as more deer moved into these areas to take advantage of the newly available food. During this same time, other harvest units, especially those that are currently high-value deer habitat, would have reduced deer habitat capability after timber harvest. The abundance of deer in these areas may decline with reduced habitat capability, and the distribution of deer may also change, with deer leaving these areas to find more favorable foraging elsewhere.

Beginning at approximately year 26 after harvest, the model predicts that harvested areas would have almost no value as winter deer habitat, regardless of the initial habitat capability. At that time, as stands enter the stem-exclusion stage, deer abundance would be likely to decline, and distribution would also change, as deer leave these areas to find higher-value habitat. Ultimately, and especially in intensively harvested areas, deer may become concentrated in areas of remaining high-value habitat. This could result in lower over-winter survival and lower rates of reproduction due to increased competition for food. Deer that are highly concentrated may also be more vulnerable to predation by wolves.

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Although deer numbers in some areas may increase temporarily in response to increased food availability in harvest units, it is predicted that deer abundance would ultimately decline, approximately in proportion to timber harvest levels. As stated in the Wildlife section, the action alternatives propose harvesting timber that would change existing deer habitat capability within the project area by approximately 1 percent, depending on alternative, by the end of the expected harvest. By the time the stem-exclusion stage begins in approximately 2035, reductions in habitat capability between 5 and 11 percent are predicted. Reductions in habitat capability and changes in deer distribution in the project area would be greatest under Alternative 4, followed, in order of decreasing impact, by Alternatives 2, 3, 6, 5, and 1 (see Table 3-54 and discussion in the Wildlife section in this chapter).

#### Access to Deer

Potential impacts of roads and increased access on deer numbers are discussed in detail in the Wildlife section. Project-related activities are not expected to restrict access to deer for subsistence use. In fact, access would improve as a result of roads associated with four of the five action alternatives. Although roads would be closed to motorized vehicles after timber removal is completed in all but one alternative, roadbeds would still increase opportunities for walk-in subsistence deer hunting. Roads would increase opportunities for subsistence hunting, and would open areas to hunting that historically have been relatively inaccessible.

Roads proposed under Alternatives 2, 3, 4, and 6 would likely result in an increased harvest of deer in the project area. All roads proposed in Alternatives 2, 3, and 6 would be closed to motorized vehicles after timber harvest. The mainline roads would remain open in Alternative 4. Alternative 5 proposes no roads and therefore would not affect access to deer.

Alternatives 3 and 6 would likely have a greater impact on deer harvest than Alternative 2, especially by Ketchikan hunters, because the road would be connected to the existing airport transportation system on the east side of Gravina (via a new road to be constructed by Ketchikan Gateway Borough). Alternative 4 would have the greatest impact because the mainline roads would remain open after timber harvest is completed. These roads, whether open or closed, would disproportionately increase opportunities for Ketchikan and Saxman hunters, as compared with hunters from Metlakatla, and it is likely that harvest of deer would increase, especially with an open road system.

#### Competition for Deer

The impacts of increasing hunter demand for deer, increased access, and reductions in deer habitat capability on deer numbers are described in detail in the Wildlife section. Expected declines in deer abundance, resulting from timber harvest and increased access to deer by both rural and non-rural hunters, combined with projected increases in hunter demand for deer, would ultimately lead to increased competition for deer. A deer population at carrying capacity should be able to support a sustainable hunter harvest (demand) of approximately 10 percent of the habitat capability while also providing a reasonably high level of hunter success (Forest Plan Final EIS, pg. 3-596). Hunter success can be expected to decline in areas where demand represents 10 to 20 percent of habitat capability. If demand exceeds 20 percent of habitat capability, harvest of deer by hunters may be directly or indirectly restricted (Forest Plan Final EIS, p. 3-537).

Current hunter demand is approximately 8 percent of habitat capability. Even with no timber harvest on National Forest or non-National Forest System land, projected hunter demand for deer is expected to be approximately 13 percent of habitat capability on Gravina Island over the next 30 years. The action alternatives would increase this to about 14 percent, depending on the alternative (Table 3-55 in the Wildlife section). Under these conditions, hunter demand may not be met after a severe snow winter. It should be noted that projected demand for deer by rural hunters does not exceed 1 percent of habitat capability under any of the action alternatives. If restrictions were to become necessary, they would first occur on non-rural users.

The Forest Plan projections of hunter demand for deer were based solely on projected increases in human population; they did not account for changes in access. Increases in demand (and competition between rural and non-rural hunters) would be greater than predicted in the Forest Plan under Alternatives 2, 3, 4 and 6, where the road system would increase access to Ketchikan hunters. Competition would be most severe in Alternative 4.

## Cumulative Effects

### Other Landowners

Alaska Department of Natural Resources (DNR) has indicated they will move forward with a timber sale on State lands on Gravina Island regardless of activities on NFS lands. DNR may build up to 17.9 miles of road for their timber sales. In the Gravina Access Project Draft EIS (August 2003), the preferred alternative (F-1) is to construct bridges between Ketchikan and Gravina Island via Pennock Island, and a connecting road to the airport. Conceptually, this transportation system may be linked to the road systems on State and NFS lands by the proposed road construction on Borough lands.

Combined with the reasonably foreseeable actions on non-National Forest System lands, the cumulative impact of timber harvest on deer abundance and distribution on Gravina Island (WAA 101) as a whole would be greatest under Alternative 4, followed, in order of decreasing impact, by Alternatives 2, 3, 5 and 6, and 1 (see Table 3-54 and discussion in the Wildlife section). However, it is not anticipated that the cumulative proposed timber harvest would, by itself, cause a significant possibility of a significant restriction on subsistence use of deer in the project area.

If the proposed hard link transportation system between Ketchikan and Gravina is completed, the cumulative effect of the proposed road systems on NFS, DNR, and Borough lands would significantly increase access on Gravina Island. This would likely increase hunter harvest, causing further reductions in deer abundance, additional changes in deer distribution, and increased competition for deer between rural and non-rural hunters. Although Alternatives 2, 3, 4, or 6 could all result in a significant possibility of a significant restriction on the subsistence use of deer on Gravina Island, the increased access provided by the open road system proposed in Alternative 4 would have the greatest effect. In the event that Ketchikan hunters are restricted from harvesting deer on Prince of Wales Island, the increased access provided by the roaded alternatives could lead to unsustainable levels of deer harvest on Gravina Island. However, if regulations were changed to limit non-rural hunting, an open road system could benefit subsistence hunters by providing increased access to deer. This benefit would be greatest to residents of Saxman, because Metlakatla would not have roaded access to Gravina from their community.

Alternatives 1 (No Action) and 5 (no road construction) would not increase access on National Forest System lands. The proposed road systems on State and Borough lands would still increase access for hunters from Ketchikan and likely lead to increased hunter harvest on Gravina Island. However, this impact would be less than under the roaded alternatives.

## Finding

Project-related or reasonably foreseeable future timber harvest is not expected to cause a significant possibility of a significant restriction on resource distribution and abundance, or significantly restrict access to subsistence resources. However, under Alternatives 2, 3, 4 and 6, increases in access and competition with non-rural hunters may result in a significant possibility of a significant restriction on subsistence uses. Alternatives 1 and 5 do not propose any roads and would not cause a significant possibility of a significant restriction.

## Subsistence Hearings

The Forest Service held formal subsistence hearings in three communities: Metlakatla (February 13, 2001), Saxman (February 26, 2001), and Ketchikan (April 23, 2001). Eight individuals testified at the Metlakatla hearing, 16 individuals testified at the Saxman hearing, and 13 individuals testified at the Ketchikan hearing. This testimony re-affirmed the importance of, and concerns for, deer hunting and other subsistence resources on Gravina Island, including marine resources in Bostwick Inlet. A complete transcript of the testimony from these hearings is included as Appendix C of this Final EIS.



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# Chapter 4

## Lists

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## Lists

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## Glossary

### Access

The opportunity to approach, enter, and make use of public lands.

### Access Management

Acquiring rights and developing and maintaining facilities needed by people to get to and move through public lands (physical attributes).

### Adfluvial

Species or populations of fish that live in lakes and enter streams to spawn, but do not go to sea.

### Alaska National Interest Lands Conservation Act (ANILCA)

Passed by Congress in 1980, this legislation designated 14 National Forest Wilderness areas in Southeast Alaska. The Alaska National Interest Lands Conservation Act of December 2, 1980, Public Law 96-487, 96th Congress, 94 Stat. 2371-2551, Section 810 requires evaluations of subsistence impacts before changing the use of these lands.

### Native Claims Settlement Act (ANCSA) Alaska Native Claims Settlement Act (ANCSA)

Public Law 92-203, 92nd Congress, 85 Stat. 2371-2551. Approved December 18, 1971, Native Claims Settlement Act (ANCSA) ANCSA provides for the settlement of certain land claims of Alaska Natives and for other purposes.

### Alluvial Fan

A cone-shaped deposit of organic and mineral material made by a stream where it runs out onto a level plain or meets a slower stream.

### Alpine

Parts of mountains above tree growth and/or the organisms living there.

### Alternative

One of several policies, plans, or projects proposed for decision making.

### Anadromous Fish

Anadromous fish (such as salmon, steelhead, and sea-run cutthroat trout) spend part of their lives in freshwater and part of their lives in saltwater.

### Aquatic Habitat Management Unit (AHMU)

A mapping unit that displays an identified value for aquatic resources. It is a mechanism for carrying out aquatic resource management policy.

*Class I:* Streams and lakes with anadromous or adfluvial fish habitat, or high-quality resident fish waters listed in Appendix 68.1, Region 10 Aquatic Habitat Management Handbook (FSH 2609.24), June 1986; or habitat above fish migration barriers known to be reasonable enhancement opportunities for anadromous fish.

*Class II:* Streams and lakes with resident fish populations and generally steep (6-15 percent) gradient (can also include streams from 0-5 percent gradient) where no anadromous fish occur, and otherwise not meeting Class I criteria. These populations have limited fisheries values and generally occur upstream of migration barriers or have other habitat features that preclude anadromous fish use.

*Class III:* Perennial and intermittent streams with no fish populations but which have sufficient flow or transport sufficient sediment and debris to have an immediate influence on downstream water quality or fish habitat capability. These streams generally have bankfull widths greater than 5 feet and are highly incised into the surrounding hillslope.

*Class IV:* Intermittent, ephemeral, and small perennial channels with insufficient flow or sediment transport capabilities to have an immediate influence on downstream water quality or fish habitat capability. These streams generally are shallowly incised into the surrounding hillslope.

*Non-streams:* Rills and other watercourses, generally intermittent and less than 1 foot in bankfull width, little or no incisement into the surrounding hillslope, and with little or no evidence of scour.

### **Background**

The distant part of a landscape. The seen or viewed area located from 3 or 5 miles to infinity from the viewer. (See "Foreground" and "Middleground".)

### **Beach Fringe**

The area inland from salt water shorelines, which is typically forested.

### **Best Management Practice (BMP)**

Practices used for the protection of water quality. BMPs are designed to prevent or reduce the amount of pollution from nonpoint sources or other adverse water quality impacts while meeting other goals and objectives. BMPs are standards to be achieved, not detailed or site-specific prescriptions or solutions. BMPs as defined in the USDA Forest Service Soil & Water Conservation Handbook are mandated for use in Region 10 under the Tongass Timber Reform Act.

### **Biological Diversity (Biodiversity)**

The variety of life in all its forms and at all levels. This includes the various kinds and combinations of: genes; species of plants, animals, and microorganisms; populations; communities; and ecosystems. It also includes the physical and ecological processes that allow all levels to interact and survive. The most familiar level of biological diversity is the species level, which is the number and abundance of plants, animals, and microorganisms.

### **Biological Potential**

The maximum possible output of a given resource limited only by its inherent physical and biological characteristics.

### **Blowdown**

See windthrow.

### **Board Foot (BF)**

A unit of wood 12" X 12" X 1". One acre of commercial timber in Southeast Alaska on the average yields 28,000-34,000 board feet per acre (ranging from 8,000-90,000 board feet per acre). One million board feet (MMBF) would be the volume of wood covering 1 acre 2 feet thick. One million board feet yields approximately enough timber to build 120 houses or 75,555 pounds of dissolving pulp.

### **Buffer**

An area around a resource where timber harvest is restricted or prohibited. For example, the Tongass Timber Reform Act (TTRA) requires that timber harvest be prohibited in an area no less than 100 feet on each side of all Class I streams and Class II streams which flow directly into Class I streams. This 100-foot area is known as a "stream buffer".

### **Capability**

An evaluation of a resource's inherent potential for use.

### **Channel Migration**

Movement of a stream or river channel within a floodplain area usually over an extended period of time.

### **Clearcut**

The harvesting in one cut of all trees on an area. The area harvested may be a patch, strip, or stand large enough to be mapped or recorded as a separate class in planning for sustained yield. Clearcut size on the Tongass National Forest is limited to 100 acres, except for specific conditions noted in the Alaska Regional Guide.

### **Code of Federal Regulations (CFR)**

A codification of the general and permanent rules published in the Federal Register by the executive departments and agencies of the Federal Government.

### **Commercial Forest Land (CFL)**

Productive Forest land that is producing or capable of producing crops of industrial wood and is not withdrawn from timber utilization by statute or administrative regulation. This includes areas suitable for management and



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generally capable of producing in excess of 20 cubic feet per acre of annual growth or in excess of 8,000 board feet net volume per acre. It includes accessible and inaccessible areas.

*Normal CFL:* Timber that can be economically harvested with locally available logging systems. Composed of two categories:

*Standard:* Timber that can be economically harvested with locally available logging systems, such as highlead or short-span skyline.

*Special:* Timber that is in areas where special consideration is needed to protect other resources but can be harvested with locally available logging systems.

*Non-standard CFL:* Timber that cannot be harvested with locally available logging systems and would require the use of other logging systems such as helicopter or long-span skyline.

### **Commercial Thinning**

Thinning a stand where the trees to be removed are large enough to sell.

### **Connectivity**

A measure of the extent that forest areas between or outside reserves provide habitat for breeding, feeding, dispersal, and movement.

### **Corridor**

Connective links of certain types of vegetation between patches of suitable habitat which are necessary for certain species to facilitate movement of individuals between patches of suitable habitat. Also refers to transportation or utility rights-of-way.

### **Cover**

Refers to trees, shrubs, or other landscape features that allow an animal to partly or fully conceal itself.

### **Critical Habitat**

Specific terrain within the geographical area occupied by threatened or endangered species. Physical and biological features that are essential to conservation of the species and which may require special management considerations or protection are found in these areas.

### **Crown**

The tree canopy. The upper part of a tree or woody plant that carries the main branch system and foliage.

### **Cruise**

Refers to the general activity of determining timber volumes and quality as opposed to a specific method.

### **Cubic Foot (CF)**

Equivalent to a cube of wood with 1-foot sides. The cubic foot volume is a measure of the total sound wood in a tree and is a more accurate depiction of wood volume than the board foot measure. This is usually referred to in CCF (hundred cubic feet).

### **Cull Logs**

Trees that do not meet certain quality specifications.

### **Cultural Resources**

Historic or prehistoric objects, sites, buildings, structures, and their remains, resulting from past human activities.

### **Cumulative Effects**

The impacts on the environment resulting from additional incremental impacts of past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such actions. Cumulative impacts can result from individually minor but collectively significant actions occurring over time.

### **Cutover**

Areas harvested recently.

**Diameter Breast Height (DBH)**

The diameter of a tree measured 4 feet 6 inches from the ground.

**Deer Winter Range**

Locations that provide food and shelter for Sitka black-tail deer under moderately severe to severe winter conditions.

**Degradation**

The general lowering of the surface of the land by erosive processes, especially by the removal of material through erosion and transportation by flowing water.

**Developed Recreation**

Recreation that requires facilities that, in turn, result in concentrated use of an area. Facilities in these areas might include roads, parking lots, picnic tables, toilets, drinking water, and buildings.

**Direct Employment**

The jobs that are immediately associated with the Long-term Contract Timber Sale, including, for example, logging, sawmills, and pulp mills.

**Diversity**

The distribution and abundance of different plant and animal communities and species within the area controlled by the 1997 Forest Plan.

**Draft Environmental Impact Statement (Draft EIS)**

A statement of environmental effects for a major Federal action which is released to the public and other agencies for comment and review prior to a final management decision. Required by Section 102 of the National Environmental Policy Act (NEPA).

**Eagle Nest Tree Buffer Zone**

A 330-foot radius around eagle nest trees established in an agreement between the U.S. Fish and Wildlife Service and the Forest Service.

**Ecological Province**

Twenty-one ecological subdivisions of Southeast Alaska that are identified by generally distinct ecological, physiographic, and biogeographic features. Plant and animal species composition, climate, and geology within each province are generally more similar within than among adjacent provinces. Historical events (such as glaciers and uplifting) are important to the nature of the province and to the barriers that distinguish each province.

**Ecosystem**

A community of organisms and its physical setting. An ecosystem, whether a fallen log or an entire watershed, includes resident organisms, non-living components such as soil nutrients, inputs such as rainfall, and outputs such as organisms that disperse to other ecosystems.

**Effects**

Effects, impacts, and consequences as used in this environmental impact statement are synonymous. Effects may be ecological (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic, historical, cultural, economic, or social, and may be direct, indirect, or cumulative.

*Direct Effects:* Results of an action occurring when and where the action takes place.

*Indirect Effects:* Results of an action occurring at a location other than where the action takes place and/or later in time, but in the reasonably foreseeable future.

*Cumulative Effects:* See Cumulative Effects.

**Encumbered Lands**

Lands with a claim, lien, charge, or liability attached to and binding real property.

# 4 Lists

## **Endangered Species**

Any species of animal or plant that is in danger of extinction throughout all or a significant portion of its range. Plant or animal species identified by the Secretary of the Interior as Endangered in accordance with the 1973 Endangered Species Act. See also Threatened Species, Sensitive Species.

## **Endemic**

Restricted to a particular locality. For example, a particular species or subspecies may occur on only one or a very few islands.

## **Erosion**

The wearing away of the land surface by running water, wind, ice, gravity, or other geological activities.

## **Escapement**

Adult anadromous fish that escape from all causes of mortality (natural or human-caused) to return to streams to spawn.

## **Estuary**

For the purpose of this EIS process, estuary refers to the relatively flat, intertidal, and upland areas generally found at the heads of bays and mouths of streams. They are predominately mud and grass flats and are unforested except for scattered spruce or cottonwood.

## **Even-aged Management**

The application of a combination of actions that result in the creation of stands in which trees of essentially the same age grow together. The difference in age between trees forming the main canopy level of a stand usually does not exceed 20 percent of that age of the stand at harvest rotation age. Clearcut, shelterwood, or seed tree cutting methods produce even-aged stands.

## **Executive Order**

An order or regulation issued by the President or some administrative authority under his or her direction.

## **Floodplain**

That portion of a river valley, adjacent to the river channel, which is covered with water when the river overflows its banks at flood stages.

## **Fluvial**

Of or pertaining to streams and rivers.

## **Foreground**

The stand of trees immediately adjacent to a scenic area, recreation facility, or forest highway; area located less than 1/4 mile from the viewer. See also Background and Middleground.

## **Forest and Rangeland Renewable Resources Planning Act of 1976 (RPA)**

Amended in 1976 by the National Forest Management Act. See RPA Assessment and Program.

## **Forest or Forest Land**

National Forest lands currently supporting or capable of supporting forests at a density of 10 percent crown closure or better. Includes all areas with forest cover, including old growth and second growth, and both commercial and non-commercial forest land.

## **Forested Wetland**

A wetland whose vegetation is characterized by an overstory of trees that are 20 feet or taller.

## **Forest Plan**

The Tongass Land Management Revision, signed in 1997. This is the 10-year land allocation plan for the Tongass National Forest that directs and coordinates planning, the daily uses, and the activities carried out within the forest.

## **Fragmentation**

An element of biological diversity that describes the natural condition of habitats in terms of the size of discrete habitat blocks or patches, their distribution, the extent to which they are interconnected, and the effects of



management on these natural conditions. Also the process of reducing the size and connectivity of stands within a Forest.

### **Geographic Information System (GIS)**

An information processing technology to input, store, manipulate, analyze, and display spatial and attribute data to support the decision-making process. It is a system of computer maps with corresponding site-specific information that can be electronically combined to provide reports and maps.

### **Geomorphology**

The study of the forms of the land surface and the processes producing them. Also the study of the underlying rocks or parent materials and the landforms present which were formed in geological time.

### **Guideline**

A preferred or advisable course of action or level of attainment designed to promote achievement of goals and objectives.

### **Habitat**

The sum total of environmental conditions of a specific place occupied by an organism, population, or community of plants and animals.

### **Habitat Capability**

The number of healthy animals that a habitat can sustain. Used in wildlife models to calculate rough population estimates for management indicator species.

### **Habitat Suitability Index (HSI)**

This is a value assigned to a unit of land using a computerized model that related vegetative and geographic characteristic (e.g. stand volume, proximity to a stream or cliff, slope, aspect, etc.) to the land unit's value for a particular wildlife species. Values generally range from 0 to 1, with 1 being the best. The Habitat Capability Models used to generate HSIs were developed by interagency teams of biologists using the best available information including research results and best professional judgement.

### **Indirect Employment**

The jobs in service industries that are associated with the Long-term Contract timber sale including, for example, suppliers of logging and milling equipment.

### **Inoperable Timber**

Timber that cannot be harvested by any proven method because of potential resource damage, extremely adverse economic considerations, or physical limitations.

### **Interdisciplinary Team (IDT)**

A group of people with different backgrounds assembled to research, analyze, and write a project Environmental Impact Statement. The team is assembled out of recognition that no one scientific discipline is sufficiently broad enough to adequately analyze a proposed action and its alternatives.

### **Issue**

A point, matter, or section of public discussion or interest to be addressed or decided.

### **Knutson-Vandenburg Fund (KV)**

The portion of timber sale receipts collected and used for reforestation and other renewable resource projects on the sale area.

### **Land Allocation**

The decision to use land for various resource management objectives to best satisfy the issues, concerns and opportunities and meet assigned forest output targets.

### **Land Use Designation**

A defined area of land to which specific management direction is applied, as specified in the 1997 Forest Plan.

# 4 Lists

## **Landslides**

The moderately rapid to rapid downslope movement of soil and rock materials that may or may not be water-saturated.

## **Large Woody Debris**

Any large piece of relatively stable woody material having a diameter of at least 4 inches and a length greater than 3 feet that intrudes into the stream channel. Also called Large Organic Debris (LOD).

## **Log Transfer Facility (LTF)**

A facility that is used for transferring commercially-harvested logs to and from a vessel or log raft, or the formation of a log raft. It is wholly or partially constructed in waters of the United States and location and construction are regulated by the 1987 Amendments to the Clean Water Act. Formerly termed "terminal transfer facility" or "log dump".

## **Logging Systems**

*Long-span cable:* Single span cable yarding system with a long corner exceeding 1000 feet, horizontal distance. Typically, this includes a variety of live skyline systems, including standing skylines and running skylines where reach is long.

*Short-span cable:* All cable systems with a longer corner of not more than 1000 feet, horizontal distance. Typically, this includes running skyline with a carriage and chokers, running skyline with grapple, live skyline with gravity return, and highlead.

*Running skyline:* A yarding system with three suspended moving lines, generally referred to as the main, haulback, and slack-pulling, that when properly tensioned will provide lift, travel, and control to the carriage; normally indicates a gantry type tower and a three-drum yarder.

*Shovel:* The process of forwarding logs from stump to landing by repeated swinging of logs by a hydraulic excavator-based log loader.

*Helicopter:* Flight path cannot exceed 40 percent downhill or 30 percent uphill; landings must be selected so there is adequate room for the operation and so that the helicopter can make an upwind approach to the drop zone.

## **MBF**

A thousand board feet net sawlog and utility volume.

## **MMBF**

A million board feet net sawlog and utility volume.

## **Management Indicator Species (MIS)**

Species selected in a planning process that are used to monitor the effects of planned management activities on viable populations of wildlife and fish, including those that are socially or economically important.

## **Management Prescriptions**

Management practices and intensity selected and scheduled for application on a specific area (e.g., a land use designation) to attain multiple-use and other goals and objectives.

## **Management Requirement**

Standards for resource protection, vegetation manipulation, silvicultural practices, even-aged management, riparian areas, and soil and water and diversity, to be met in accomplishing National Forest System goals and objectives (see 36 CFR 219.17).

## **Mass Movement**

The downslope movement of a block or mass of soil. This usually occurs under conditions of high soil moisture and does not include individual soil particles displaced as surface erosion.

## **Maritime Climate**

Weather conditions controlled by an oceanic environment characterized by small annual temperature ranges and high precipitation.

### **Middleground**

The visible terrain beyond the foreground where individual trees are still visible but do not stand out distinctly for the landscape; area located from 1/4 to 5 miles from the viewer. See also Foreground and Background.

### **Mineral Soils**

Soils consisting predominately of, and having its properties determined by, mineral material.

### **Minimum Viable Population**

A population with the estimated numbers and distribution of reproductive individuals to maintain the population over time.

### **Mitigation**

Measures designed to counteract environmental impacts or to make impacts less severe. These may include: avoiding an impact by not taking a certain action or part of an action; minimizing an impact by limiting the degree or magnitude of an action and its implementation; rectifying the impact by repairing, rehabilitating, or restoring the affected environment; reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; or compensating for the impact by replacing or providing substitute resources or environments.

### **Mixed Conifer**

In Southeast Alaska, mixed conifer stands usually consist of western hemlock, mountain hemlock, Alaska yellowcedar, Western redcedar, and Sitka spruce species. Shore pine may occasionally be present depending on individual sites.

### **Model**

A representation of reality used to describe, analyze, or understand a particular concept. A model may be a relatively simple qualitative description of a system or organization, or a highly abstract set of mathematical equations. A model has limits to its effectiveness, and is used as one of several tools to analyze a problem.

### **Monitoring**

A process of collecting information to evaluate whether or not objectives of a project and its mitigation plan are being realized. Monitoring can occur at different levels: to confirm whether mitigation measures were carried out in the manner called for, to determine whether the mitigation measures were effective, or to validate whether overall goals and objectives were appropriate. Different levels call for different methods of monitoring.

### **Multiple-aged Stands**

An intermediate form of stand structure between even and uneven-aged stands. These stands generally have two or three distinct tree canopy levels occurring within a single stand.

### **Multiple Use**

The management of all the various renewable resources of the National Forest System to be used in the combination that will best met the needs of the American people.

### **Muskeg**

In Southeast Alaska, a type of bog that has developed over thousands of years in depressions or flat areas on gentle to steep slopes. Also called peatlands.

### **National Environmental Policy Act (NEPA) of 1969**

An Act to declare a national policy which will encourage productive and enjoyable harmony between humankind and the environment, to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of humanity, to enrich the understanding of the ecological systems and natural resources important to the Nation, and to establish a Council on Environmental Quality (The Principal Laws Relating to Forest Service Activities, Agricultural Handbook 453. USDA Forest Service, 359 pp.).

### **National Forest Management Act (NFMA)**

A law passed in 1976 as an amendment to the Forest and Rangeland Renewable Resources Planning Act requiring the preparation of Regional Guides and Forest Plans and the preparation of regulations to guide that development.



# 4 Lists

## **Native Selection**

Application by Native corporations and individuals to a portion of the USDI Bureau of Land Management for conveyance of lands withdrawn in fulfillment of Native entitlements established under ANSCA.

## **Net Sawlog Volume**

Tree or log volume suitable in size and quality to be processed into lumber. In Southeast Alaska, depending on the market, the volume may be processed as pulp or lumber.

## **No-action Alternative**

The most likely condition expected to exist in the future if current management direction were to continue unchanged.

## **Non-commercial Forest Land**

Land with more than 10 percent cover of commercial tree species but not qualifying as Commercial Forest Land.

## **Non-commercial species**

Species that have no economic values at this time nor anticipated timber value within the near future.

## **Non-Forest Land**

Land that has never supported forests and lands formerly forested but now developed for such nonforest uses as crops, improved pasture, etc.

## **Notice of Intent (NOI)**

A notice printed in the Federal Register announcing that an Environmental Impact Statement will be prepared. The NOI must describe the proposed action and possible alternatives, describe the agency's proposed scoping process, and provide a contact person for further information.

## **Old Growth**

Ecosystems distinguished by old trees and related structural attributes. Old growth encompasses the later stages of forest stand development that typically differ from earlier stages in a variety of characteristics which may include larger tree size, higher composition, and different ecosystem function. The structure and function of an old-growth ecosystem will be influenced by its stand size and landscape position and context.

## **Organic Soils**

Soils that contain a high percentage (generally greater than 20 to 30 percent) of organic matter throughout the soil depth.

## **Parent Material**

The unconsolidated and partially-weathered material (or the C Horizon) from which upper layers of soil developed.

## **Partial Cut**

Method of harvesting trees where any number of live stems are left standing in any of various spatial patterns. This does not include clearcutting. Can include seed tree, shelterwood, or other methods.

## **Patch**

A non-linear surface area differing in appearance from its surroundings.

## **Payments to States**

A fund consisting of approximately 25 percent of the gross annual timber receipts received by the National Forests in that State. This is returned to the State for use on roads and schools.

## **Peak Flow**

The highest discharge of water recorded over a specified period of time at a given stream location. Often thought of in terms of spring snowmelt, summer, fall, or winter rainy season flows. Also called maximum flow.

## **Planning Area**

The area of the National Forest System controlled by a decision document.

## **Planning Record**

A system that records decisions and activities that result from the process of developing a forest plan, revision, or significant amendment.

**Plant Communities**

Aggregations of living plants having mutual relationships among themselves and to their environment. More than one individual plant community.

**Population Viability**

Ability of a population to sustain itself.

**Productive Old Growth (POG)**

Old-growth forest capable of producing at least 20 cubic feet of wood fiber per acre per year, or having greater than 8,000 board feet per acre.

**Public Participation**

Meetings, conferences, seminars, workshops, tours, written comments, responses to survey questionnaires, and similar activities designed and held to obtain comments from the public about Forest Service activities.

**Record of Decision**

A document separate from but associated with an Environmental Impact Statement which states the decision, identifies all alternatives, specifying which were environmentally preferable, and states whether all practicable means to avoid environmental harm from the alternative have been adopted, and if not, why not.

**Reforestation**

The natural or artificial restocking of an area with trees.

**Regeneration**

The process of establishing a new crop of trees on previously-harvested land.

**Resident Fish**

Fish that are not anadromous and that reside in freshwater on a permanent basis. Resident fish include non-anadromous Dolly Varden char and cutthroat trout.

**Responsible Official**

The Forest Service employee who has the delegated authority to make a specific decision.

**Restoration**

The long-term placement of land back into its natural condition or state of productivity.

**Revegetation**

The re-establishment and development of a plant cover. This may take place naturally through the reproductive processes of the existing flora or artificially through the direct action of reforestation or reseeded.

**Riparian Area**

Area with distinctive resource values and characteristics that contain elements of aquatic and riparian ecosystems, which can be geographically delineated.

**Riparian Ecosystem**

Land next to water where plants that are dependent on a perpetual source of water occur.

**Roads**

*Classified:* Roads usually developed and operated for long-term land and resource management purposes to constant service.

*Temporary:* For National Forest timber sales, temporary roads are constructed to harvest timber on a one-time basis. These logging roads are not considered part of the permanent Forest transportation network and have stream crossing structures removed, erosion measures put into place, and the road closed to vehicular traffic after harvest is completed.

**Roadless Area**

An area of undeveloped public land within which there are no improved roads maintained for travel by means of motorized vehicles intended for highway use.

# 4 Lists

## **Rotation**

The planned number of years (100-200 years in Alaska) between the time that a forest stand is regenerated and its next cutting at a specified stage of maturity. Gravina Island is specified as a 100-year rotation.

## **RPA Assessment and Program**

The RPA Assessment is prepared every 10 years and describes the potential of the nation's forests and rangelands to provide a sustained flow of goods and services. The RPA Program is prepared every 5 years to chart the long-term course of Forest Service management of the National Forests, assistance to State and private landowners, and research. They are prepared in response to Sections 3 and 4 of the Forest and Rangeland Renewable Resources Planning Act of 1974 (RPA) (16 U.S.C. 1601).

## **Sacred Site**

"Any specific, discrete, narrowly delineated location on Federal land that is identified by an Indian tribe, or Indian individual determined to be an appropriately authoritative representative of an Indian religion, as sacred by virtue of its established religious significance to, or ceremonial use by, an Indian religion; provided that the tribe or appropriately authoritative representative of an Indian religion has informed the agency of the existence of such a site."

## **Sawlog**

That portion of a tree that is suitable in size and quality for the production of dimension lumber collectively known as sawtimber.

## **Scheduled Lands**

Land suitable and scheduled for timber production and which are in the land base for the calculation of the allowable sale quantity and long-term sustained yield timber capacity.

## **Scheduled Timber Harvests**

Timber harvests done as part of meeting the allowable sale quality.

## **Scoping Process**

Early and open activities used to determine the scope and significance of a proposed action, what level of analysis is required, what data is needed, and what level of public participation is appropriate. Scoping focuses on the issues surrounding the proposed action, and the range of actions, alternatives, and impacts to be considered in an EA or an EIS.

## **Second Growth**

Forest growth that has become established following some disturbance such as cutting, serious fire, or insect attack; even-aged stands that will grow back on a site after removal of the previous timber stand.

## **Sediment**

Solid material, both mineral and organic, that is in suspension, is being transported, or has been moved from its site of origin by air, water, gravity, or ice and has come to rest on the earth's surface.

## **Selective Cutting**

The annual or periodic removal of trees (particularly the mature), individually or in small groups from an uneven-aged forest to achieve the balance among diameter classes needed for sustained yields, and in order to realize the yield, and establish a new crop of irregular constitution. Note: The improvement of the forest is a primary consideration.

## **Sensitive Species**

Plant and animal species which are susceptible or vulnerable to activity impacts or habitat alterations. Those species that have appeared in the Federal Register as proposed for classification or are under consideration for official listing as endangered or threatened species, that are on a non-official State list, or that are recognized by the Regional Forester as needing special management to prevent placement on Federal or State lists.

## **Silviculture**

The science of controlling the establishment, composition, and growth of forests.



**Smolt**

Young silvery-colored salmon or trout which move from freshwater streams to saltwater.

**Soil Productivity**

The capacity of a soil, in its normal environment, to produce a specific plant or sequence of plants under a specific system of management.

**Spawning Area**

The available area in a stream course which is suitable for the deposition and incubation of salmon or trout eggs.

**Stand (Tree Stand)**

An aggregation of trees occupying a specific area and sufficiently uniform in composition, age arrangement, and condition as to be distinguishable from the forest in adjoining areas.

**Standard**

A course of action or level of attainment required by the 1997 Forest Plan to promote achievement of goals and objectives.

**State Historic Preservation Officer (SHPO)**

State-appointed official who administers Federal and State programs for cultural resources.

**Stocking**

The degree of occupancy of land by trees as measured by basal area or number of trees and as compared to a stocking standard; that is, the basal area or number of trees required to fully use the growth potential of the land.

**Stream Classes**

See Aquatic Habitat Management Unit.

**Stream Order**

First-order streams are the smallest unbranched tributaries; second-order streams are initiated by the point where two first-order streams meet; third-order streams are initiated by the point where two second-order streams meet, and so on.

**Structural Diversity**

The diversity of forest structure, both vertically and horizontally, which provides for a variety of forest habitats such as logs and multi-layered forest canopy for plants and animals.

**Stumpage**

The value of timber as it stands uncut in terms of dollar value per thousand board feet.

**Subsistence**

Section 803 of the Alaska National Interest Lands Conservation Act defines subsistence use as, "the customary and traditional uses by rural Alaska residents of wild renewable resources for direct, personal or family consumption as food, shelter, fuel, clothing, tools, or transportation; for the making and selling of handicraft articles out of nonedible by-products of fish and wildlife resources taken for personal or family consumption; for barter, or sharing for personal or family consumption; and for customary trade."

**Subsistence Use Area**

Important Subsistence Use Areas include the "most reliable" and "most often hunted" categories from the Tongass Resource Use Cooperative Survey (TRUCS) and from subsistence survey data from ADF&G, the University of Alaska, and the Forest Service, Region 10. Important use areas include both intensive and extensive use areas for subsistence harvest of deer, furbearers, and salmon.

**Substantive Comment**

A comment that provides factual information, professional opinion, or informed judgement germane to the action being proposed.

**Substrate**

The type of material in the bed (bottom) of rivers and streams.

# 4 Lists

## **Succession**

The ecological progression of community change over time, characterized by displacements of species leading towards a stable climax community.

## **Suitable**

Commercial forest land identified as having both the biological capability and availability to produce industrial wood products.

## **Suitable Forest Land**

Forest land for which technology is available that will ensure timber production without irreversible resource damage to soils, productivity, or watershed conditions, and for which there is reasonable assurance that such lands can be adequately restocked, and for which there is management direction that indicated that timber production is an appropriate use of that area.

## **Suspended Sediment**

The very fine soil particles which remain in suspension in water for a considerable period of time without contact with the stream or river channel bottom.

## **Sustained Yield**

The amount of renewable resources that can be produced continuously at a given intensity of management.

## **Tentatively Suitable Forest Land**

Forest land that is producing or is capable of producing crops of industrial wood and: (a) has not been withdrawn by Congress, the Secretary of Agriculture or the Chief of the Forest Service; (b) existing technology and knowledge is available to ensure timber production without irreversible damage to soils productivity, or watershed conditions; (c) existing technology and knowledge, as reflected in current research and experience, provides reasonable assurance that it is possible to restock adequately within 5 years after final harvest; and (d) adequate information is available to project responses to timber management activities.

## **Thinning**

The practice of removing some of the trees in a stand so that the remaining trees will grow faster due to reduced competition for nutrients, water, and sunlight. Thinning may also be done to change the characteristics of a stand or wildlife or other purposes. Thinning may be done at two different stages.

## **Threatened Species**

Plant or animal species which is likely to become endangered throughout all or a significant portion of its range within the foreseeable future, as defined in the Endangered Species Act of 1973, and which has been designated in the Federal Register by the Secretary of the Interior as a Threatened Species. See also Endangered Species, Sensitive Species.

## **Threshold**

The point or level of activity beyond which an undesirable set of responses begins to take place within a given resource system.

## **Tiering**

Eliminating repetitive discussions of the same issue by incorporating by reference. The general discussion in an environmental impact statement of broader scope; e.g., this document is tiered to the Tongass Land and Resource Management Plan, as amended.

## **Timber Appraisal**

Establishing the fair market value of timber by taking the selling value minus manufacturing costs, the cost of getting logs from the stump to the manufacturer, and an allowance for profit and risk.

## **Timber Classification**

Forested land is classified under each of the land management alternatives according to how it relates to be management of the timber resource. The following are definitions of timber classifications used for this purpose.

*Nonforest:* Land that has never supported forests and land formerly forested where use for timber production is precluded by development or other uses.

*Forest:* Land at least 10 percent stocked (based on crown cover) by forest trees of any size, or formerly having had such tree cover and not currently developed for nonforest use.

*Suitable or suitable available:* Land to be managed for timber production on a regulated basis.

*Unsuitable:* Forest land withdrawn from timber utilization by statute or administrative regulation (for example, wilderness), or identified as inappropriate for timber production in the Forest planning process.

*Commercial forest:* Forest land tentatively suitable for the production of continuous crops of timber and that has not been withdrawn.

### **Timber Harvest Unit**

A "Timber Harvest Unit" is a portion of a timber sale within which Forest Service specifies for harvest all or part of the timber to meet the requirements of a timber sale contract.

### **Timber Stand Improvement (TSI)**

All noncommercial intermediate cutting and other treatments to improve composition, condition, and volume growth of a timber stand.

### **Tongass Land and Resource Management Plan (Forest Plan)**

The 10-year land allocation plan for the Tongass National Forest that directs and coordinates planning, the daily uses, and the activities carried out within the forest.

### **Turbidity**

An indicator of the amount of sediment suspended in water.

### **Two-aged management**

A silvicultural method in which the majority of the trees in a harvest unit are cut in one entry, and the rest are left as residual tree, either singly or in patches. The residual trees remain unharvested to provide structural diversity and older-aged trees within the second-growth stand.

### **Understory**

The trees and shrubs in a forest growing under the canopy or overstory.

### **Uneven-aged Management**

Forest management techniques which simultaneously maintain continuous high-forest cover, recurring regeneration of desirable species, and the orderly growth and development of trees through a range of diameter or age classes. Cutting is usually regulated by specifying the number or proportion of trees of particular sizes to retain within each area, thereby maintaining a planned distribution of size classes.

### **Unscheduled Lands**

Lands suitable but not scheduled for timber production and which are not in the land base for the calculation of the allowable sale quantity nor long-term sustained yield timber capacity.

### **Unsuitable**

Forest land withdrawn from timber utilization by statute or administrative regulation; for example, Wilderness, or identified as not appropriate for timber production in the forest planning process.

### **Utility Logs**

Those logs that do not meet sawlog grade but are suitable for production of firm usable pulp chips.

### **Value Comparison Unit (VCU)**

Areas which generally encompass a drainage basin containing one or more large stream systems; boundaries usually follow easily recognizable watershed divides. Established to provide a common set of areas where resource inventories could be conducted and resource interpretations made.



# 4 Lists

## **Variety Class**

These classes describe the landscape's inherent or natural scenic quality, based on the degree of variety of landform, vegetative patterns, and water features.

## **Viable Population**

The number of individuals of a species required to ensure the long-term existence of the species in natural, self-sustaining populations adequately distributed throughout their region.

## **Viewshed**

An expansive landscape or panoramic vista seen from a road, marine waterway, or specific viewpoint.

## **Visual Quality Objectives (VQO)**

Measurable standards reflecting five different degrees of landscape alteration based upon a landscape's diversity of natural features and the public's concern for high scenic quality. The five categories of VQOs are:

*Preservation:* Permits ecological changes only. Applies to Wilderness areas and other special classified areas. Management activities are generally not allowed in this setting.

*Retention:* Provides for management activities that are not visually evident to the casual forest visitor.

*Partial Retention:* Management activities remain visually subordinate to the natural landscape.

*Modification:* Management activities may visually dominate the characteristics landscape. However, activities must borrow from naturally-established form-line color and texture so that the visual characteristics resemble natural occurrences within the surrounding area when viewed in the middleground distance.

*Maximum Modification:* Management activities may dominate the landscape but should appear as a natural occurrence when viewed as background.

## **V-Notches**

A deeply incised valley along some waterways that would look like a "V" from a cross-section. These abrupt changes in terrain features are often used as harvest unit or yarding boundaries.

## **Volume**

Stand volume based on standing net board feet per acre by Scribner Rule.

## **Volume Strata**

Categories of timber volume derived from the timber type data layer (TIMTYP) and the common land unit data layer (CLU). Three volume strata (low, medium, and high) are recognized in the Forest Plan.

*Low Strata:* The lowest range of volume for commercial forest land based on per acre volume estimates. The Forest Plan estimated the low volume class strata to contain approximately 13.9 MBF/Acre.

*Medium Strata:* The middle range of volume for commercial forest land based on per acre volume estimates. The Forest Plan estimated the medium volume class strata to contain approximately 23.3 MBF/Acre.

*High Strata:* The high range of volume for commercial forest land based on per acre volume estimates. The Forest Plan estimated the high volume class strata to contain approximately 29.9 MBF/Acre.

## **Watershed**

The area that contributes water to a drainage or stream. Portion of the forest in which all surface water drains to a common point. Watersheds can range from a few tens of acres that drain a single small intermittent stream to many thousands of acres for a stream that drains hundreds of connected intermittent and perennial streams.

## **Wetland**

Areas that are inundated by surface or groundwater frequently enough to support vegetation that requires saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands generally include: swamps, marshes, bogs, and similar areas such as sloughs, potholes, wet meadows, river overflows, mudflats, and natural ponds. See the 1997 Forest Plan pp. 3-318 and 3-321 for detailed discussion on wetland type definitions.

**Wildlife Analysis Area (WAA)**

A division of land used by the Alaska Department of Fish and Game for wildlife analysis.

**Wildlife Habitat**

The locality where a species may be found and where the essentials for its development and sustained existence are obtained.

**Windfirm**

Trees that have been exposed to the wind throughout their life and have developed a strong root system or trees that are protected from the wind by terrain features.

**Windthrow**

The act of trees being uprooted by the wind. In Southeast Alaska, Sitka spruce and hemlock trees are shallow rooted and susceptible to windthrow. There generally are three types of windthrow:

*Endemic:* where individual trees are blown over;

*Catastrophic:* where a major windstorm can destroy hundreds of acres; and

*Management Related:* where the clearing of trees in an area make the adjacent standing trees vulnerable to windthrow.

**Yarding**

The process of conveying logs from the stump to a landing location.

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